PRINCIPLES OF INJURY PREVENTION

Sports injury prevention can be characterised as being primary, secondary and tertiary.

- Primary Prevention – Examples of primary prevention includes health promotion and injury prevention (eg. ankle brace).

- Secondary Prevention – Secondary prevention can be defined as early diagnosis & intervention to ~~limit the~~ reduce the risk of reinjury.

- Tertiary prevention – Tertiary prevention focu[s] on rehabilitation to reduce or correct an existing disability.

→ Important factors that may assist in the prevention of injury :-

- warm up
- stretching
- taping and bracing
- Protective equipment
- Suitable equipment
- Appropriate surfaces
- Appropriate training
- Adequate recovery
- Psychology
- Nutrition.

1) Warm up :- • ↑ blood flow to muscles
• ↑ oxygen delivery to muscles
• ↓ rsed vascular resistance
• ↑ cellular metabolism
• ↑ speed of nerves
• ↓ number of injuries
• ↑ relaxation and concentration.

2) Stretching - Stretching is the ability to move a joint smoothly throughout a full range of movement.

Stretching may be more important for preventing injury in sports that have high intensity (eg. football, basketball)

Athletes commonly perform three types of stretching :-

a) Static stretching - In static stretching the stretch position is assumed slowly and gently & held for 30 - 60 seconds.

After holding, the muscle then can be stretched a little further again without discomfort.

This rsed stretch is then hold for 30 seconds and then relaxed.

This technique is probably the safest method of ↑sing flexibility.

b) Ballistic stretching :- In Ballistic Stretching, the muscle is stretched to near its limit, then stretched further with a Bouncing movement.

The disadvantage of this stretch is that a quick bouncing can cause tension in the muscles which result in ↑sed chances of injury.

Particularly used by Gymnastics, ballet and Dance.

c) PNF stretching :- PNF stretching is performed by alternating muscle contraction and relaxation of both agonist & antagonist muscles.

→ Principles of stretching

- Warm up prior to stretching
- Stretch before and after exercise
- Stretch gently & slowly
- Stretch to the point of tension.

3) Taping or Bracing.

Taping

- The purpose of taping is to restrict undesired motion.
- Only adhesive and non-stretch tape is used.
- The joints most suitable for taping are the ankles, wrist, finger, AC joint & Metatarsophalangeal joints.

Bracing - Bracing can be put by the athlete himself but have many ~~harmful effects~~ disadvantages such as slipping of brace, problems with size, etc.

4) Protective equipment - Protective equipment has been designed to shield various parts of our body against injury.

Eg:- **Helmets** are mostly worn by cricketers, motor cycling, cycling, ice hockey, horse riding etc.

Other equipments such as mouthguard, forearm and groin protectors, ~~arm~~ wrist guards.

5) Suitable equipment - These are the elements that contribute to or prevent sports injuries. The clinical sports clinician.

- Running shoes - Assess the foot type and advice athletes the type of shoe most suited.
- Running spikes
- football boots
- Tennis rackets

6) Appropriate surfaces - The surface on which the sports people play, plays an important role.

To prevent all possible injuries, it is important to consider playing surface hardness because its association with overuse injuries such as stress, shin pain, fracture etc.

7) Appropriate training :-

Principles of training - a) Periodisation
b) Specificity
c) Overload
d) individuality.

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a) Periodisation - It can be divided into three phases:-

- Conditioning (Preperation) - Emphasize on developing aerobic and anaerobic fitness, strength and power.

- Pre-competition (transitional) - The emphasis switches from pure conditioning to technique work.

- Competition phase - the emphasis is on the competitive performance while maintaining basic conditioning.

b) Overload - Principles of overload are:

Apply stress to the body over and above that which is easily encounter.

Allow adequate recovery time to produce a training effect.

Ise training load by changing the quantity or the intensity of training.

c) Specificity - Specificity refers to the principle of directing training to performance in athletes given sports.

It's important to identify the most imp. components of fitness for each particular sport.

d) Individuality - Athletes individuals differ in their tolerance of particular training loads, response of specific training, nutritional and lifestyle habits.

→ Training methods

- Aerobic Training - Aerobic training is performed to increa aerobic capacity or fitness.

In muscle, aerobic activity increases mitochondrial number and activity, glycogen storage and fatty acids.

- Anaerobic training - Anaerobic training improves the capacity to maintain a high rate of power production for a short durations of exercise at very high intensity.

- Strength and power training – Muscular strength is the amount of force that may be exerted by an individual in a single max. amount of ~~work~~ of muscular contraction.

Power is the max. amount of work an individual can perform in a given unit of time.

Isotonic strength training – It maybe concentric or eccentric. Resistance can be provided by free weights, pulley, weight machines etc.

Olympic type weightlifting – It is often used as part of a strength training program. Olympic lifting involves the lifting of a weight from the floor to a position above the ground.

Plyometric training – It is used for increasing power.

Pylometrics is a form of resistance training that combines a rapid ~~concentric~~ eccentric muscle contractions followed by rapid concentric contractions

to produce a fast forceful movement.

Eg – hopping, Bounding drills, Jumps over hurdles and depth jumps.

flexibility training – One or more stretching techniqu ~~develops~~ helps in developing ↑sed ROM across a joint, develop muscle strong & power.

Speed training – Athletes can develop speed by improving muscular strength & power.

Thus ↑sing stride length & cadence increases coverage of ground.

Running speed can be ↑sed by taking resistance & power training.

eg – downhill running.

Agility training – Agility training is a type of exercise training that include short Bursts of movem that involves changes of direction.

eg – Military stepping, figure of 8 run

Cross training - cross training enables the athletes to maintain aerobic fitness while reducing stress on weight bearing joints.

8) Adequate recovery

9) Psychology and injury prevention -

loss of concentration can cause severe injury.
Overarousal can also predispose to injury.

(10) Nutrition and injury prevention - Inadequate dietary protein intake may lead to muscle injury.

Inadequate amount of calcium ~~tak~~ intake may lead to bone injury.

COMMON SPORTS INJURIES

→ classification of sport injuries

(1) Acute injuries :-

a) fracture - fracture maybe due to direct or indirect trauma such as fall on a outstretched hand or a twisting injury.

complication - Infection, compartment syndrome, mal-union, non-union, DVT, nerve injury, vessels injury

b) Periosteal injury - Examples of periosteal injuries include injuries of the periosteum of the illac crest caused by direct blow.

Periosteal injury of the tibia resulting from a blow kick, stick or ball.

c) Osteochondral injury - Articular cartilage may be injured by injury such as dislocation, subluxation

· Common sites of condral and osteocondrol injuries are the superior articular surface of the talus.

Osteochondral injuries may be associated with soft tissue condition such as ligament sprain and complete rupture of ligament.

d) Dislocation & subluxation :- Dislocation or subluxation of a joint occurs when trauma produces complete or partial dislocation of the articular surfaces of a joint. of the subluxation or dislocation causes injuries to the surrounding joint capsule & ligaments.

Complication include nerve or vessel injury.

e) Sprain - Ligament injuries range from mild injury to the complete tear.

~~big~~ Sprain grades - Grade I
Grade II
Grade III

f) Strain - muscles are strained when some or all of the fibers of (m) fails to work.

Muscles that are commonly affected are - Hamstring, quadriceps and calf.

A number of factors that causes in strain:
- Inadequate warm up
- Overuse
- fatigue
- Inadequate recovery
- muscle imbalance
- Excessive muscle tightness
- insufficient joint ROM.
- faulty Biomechanics
- Previous injury.

g) Contusion :- Muscular contusion usually results from direct blow from an opposition player, or hart-hit by equipment such as football, basketball, hockey etc.

h) cramps - muscle cramps are painful involuntary muscle contractions that occur suddenly.

- The most common site of muscle is ~~calf~~ calf muscle.

- Disturbance of the central and peripheral nervous system and skeletal muscle are involved in the mechanism of cramp.

Some other cause of cramps include dehydration, low potassium or low Na^+ level.

i) Tendon tear – Complete or partial tendon tear may occur.

J) Acute compartment syndrome – ACS develops due to the injury of the muscle and surrounding structure.

It is usually seen in upper limb but can also be seen in lower limbs.

k) Traumatic Bursitis – Most injuries to the bursa are produce by over use.

A direct fall on ~~to~~ the bursa may result in ~~an~~ acute traumatic bursitis

l) Neuropraxia – Major nerve injuries are usually ~~uncommon~~ common in athletes.

However some nerves are exposed and susceptible to injury from a direct blow to the nerves.

Most often injured are – ulnar nerve at the elbow and the common peroneal nerve at the neck of fibula

Neuropraxia arise when the surrounding structures compress the nerve because of swelling or tightness.

J) Puncture wound - Injury to the skin is common among athletes especially those playing contact sports.

Open wounds may be puncture wounds.

② OVERUSE INJURY.

a) Stress fracture - It is common in some people.
Stress fracture is a micro fracture in bone that result from repetitive physical ladding.

It may occur in bone. The most common affected bones are. The tibia, Metatarsal, tarsal, fibula, femur, & pelvic.

b) Bone strain - It may appear if there is continuation of bone response to stress that ranges from mild bone strain to severe stress fracture.

Osteitis or Periosteitis

c) ~~Ostitis~~ ~~or~~ periositis – It is the primary inflammation of the bone and periosteitis is the inflammation of periosteum.

The most common Osteitis is Osteitis pubis occurs in the pubic bone of the pelvis.

Periosteitis occurs commonly at the medial border of tibia, a condition after known as 'Shin splint'.

d) Articular cartilage – Overuse injury can affect the articular cartilage of the joint.

Particularly in osteoarthritis changes range from microscopic inflammatory changes to softening and to major change.

e) Joint – Overuse injuries between joint can be synovitis & capsulitis.

Synovitis is the inflammation of synovium membrane.

Capsulitis is the inflammation of capsule of joint.

f) Ligament - The medial collateral ligament of knee becomes inflammed.

g) Muscle - Chronic compartment syndrome usually affect the lower leg but may also affect forearm.

Exercise raises the intra compartment pressure and may cause local muscle swelling and fluid retention.

- muscle hypertrophy may also occur

h) muscle soreness - A particular type of muscle soreness known as DOMS (Delayed onset muscle soreness).

It develops 24 - 48 hours after physical activity.

DOMS can be caused by Lactic acid, (m) spasm, tissue damage etc.

i) tendon - The different types of tendon injuries are tendinosis, tendinitis, paratenosynovitis, Partial tear.

→ Tendinosis – Tendinosis is a chronic tendinopathy. It mostly seen in rotator cuff, extensor carpi radialis, Patellar and Achelos tendon.

Other sides are – Adductor longus
- Biceps
- Tibialis Posterior
- flexor hallucis longus

Tendinosis often takes a long time to resolve particularly.

Tendinosis is a chronic condition involving the break down of collagen in the tendon.

Causes – Overuse of tendon
Poor Posture
Improper footwear
Tight calf muscle

C/f – • Pain in the affected tendon which moved or touched.

• Stiffness and restricted muscle in the affected area.

• appearance of the tendon lump.

Diagnosis – • History
• MRI
• Ultrasound

Treatment – • Rest
• Icing for 15 to 20 min
• Braces
• Taping
• Light stretching
• ROM exercise
• Massage
• Eargonomics

→ Tendinitis – Tendinitis is a inflammation of tendon.

Tendinitis most commonly occur in the muscles of shoulder, elbow, hand, wrist, thumb, knee and Ankle.

Some forms of tendinitis are – • Tennis elbow
• Patellar tendon
• Golfer's elbow
• Achillis tendon
• Jumper's knee
• Biceps tendon
• Swimmers shoulder
• Rotator cuff tendon.

cause – It is mainly caused by repetitive minor impact on the affected area.

Many activities that can cause tendinitis are: – • Painting
• Touching
• Gardening
• Throwing.

- Screbbing
- Cleaning house
- Tennis

In correct posture at work or home before plying sports also ↑ the risk of tendinitis.

Stresses from other conditions such as RA, gout, thyroid disorder.

CF – • Pain • swelling • loss of function
• redness. • ↑sed temperature
• Tenderness

Prevention – • Use limited use of repetitive exercise
• Start the activity / exercise in slow manner.

Treatment – • Avoid activities that ↑ problem
• NSAID's
• Massage
• Brace
• RICE – Rest, ice, compression, elevation
• Stretching
• strengthing of affected area.
• surgery

→ ~~Teno~~ Tenosynovitis – It is the inflammation of tendon and its outer covering.

cause – • Direct trauma
• Over use

Cf – • ↑sing Pain at the site of the
• affected tendon.
• Swelling.
• muscle ~~of~~ difficulty.
• tenderness

Management – Same as tendinitis.

J) Bursa – Overuse injury in bursa are quite common partricularl at subacromian bursa.
Other Bursa that are common deep to –
- illitibial band
- Retrocalcanial Bursa.

Cf – • tenderness
• Swelling
• Pain

h) Nerve – Nerve entrapment syndrome Occur in athletes as a res of swelling in the surrounding tissues

Nerves that are most commonly affected are — • Suprascapular nerve
• Posterior interosseous nerve
• Ulnar nerve
• Median nerve
• Obturator nerve
• Posterior tibial nerve.

Compression to the nerve can cause tingling and numbness to the affected extremity.

i) Skin — Blisters may occur, by external source such as shoe or equipments.

THE PREPARTICIPATION PHYSICAL EVALUATION. (PPE)

A PPE should take place for competitive athletes of all ages, genders and level of organised sports competition.

The primary objective of PPE is to provide a structural environment in which to identify and maintain the health and safety of athlete and to identify illness and injuries.

→ Who should undergo the PPE?

The PPE was developed for athlete competitions at ~~hight~~ any level.

All athletes who begin a new activity program should have PPE.

→ Who should perform PPE.

The ~~E~~ international and professional athletes are governed by their athletic organisations as who is considered qualified to perform a PPE.

→ Where to conduct P.P.E ?

Office based examinations are costly but provide privacy and the opportunity for continuity of care.

A station based examination is inexpensive and designed to have a sports focus but lacks continuity of care.

→ Objectives

The Primary objective of PPE is the detection of life - threatening or disabling condition.

PPE may help define and improve the ability to acheive this goal.

Another Primary objective of the PPE is to screen for conditions that may predispose a competitive athletes to injury.

At higher levels of competition it may also provide an opportunity to assess psychological, social & nutritional factors that may affect the performation.

→ What to include in PPE ?

- History — Past history :

chronic medical conditions
Hospitalisation
Surgeries
unpair organ
Medications
Supplements
Allergies — medications
Cardiovascular — chest pain, palpitation, fatigue, ↑ BP.
Respiratory — wheezing, cough.
orthopedic — sprain, strain.
Neurological — Head, facial injury, Headache, confusion.
eyes — Contact lenses.
females — How many in last 12 months.

- Physical Examination

→ General — Height, weight.
→ Eyes — visual accuracy, Pupil symmetry
→ Ears — Ear canals & ~~sy~~ tympanic membr
→ Nose — Nasal septum
→ Throat — Teeth, Throat lesions.
→ Lungs — Breath sound, chest expansion, thoracic cage.
→ CVS — BP, Heart rate, Rhythm, cardiac murmur.

→ Abdomen – tenderness, masses
→ Genitalia – ~~Rashes~~, ~~lesions~~ Hernia
→ Skin → Rashes, lesions.

→ Diagnostic test –

→ Cardiovascular testing – ECG, Treadmill testing.

→ Neurological – Cognitive testing

→ other – PFT, BMD, Hepatitis.

PRINCIPLES OF REHABILITATION.

The meaning of rehabilita-tion means restroration to previous capacity.

All musculoskeletal injuries requires active rehabilitation.

Each athlete has a different life style. Because of the individual differences between athletes, the therapist must customize each rehabilitation program.

The important components of rehabilitation are:

- Muscle conditioning
- flexibility
- Neuromuscular control
- functional exercise
- Sports skill
- correction of abnormal mechanics.
- maintainence of CV fitness
- Psychology.

→ Muscle Conditioning – After injury, there is rapid muscle atr[ophy] due to a ~~co~~ response to pain, inflamm[ati]-on and immobility.

There are several methods of assessing deficits in muscle strength. These include MMT, functional testing & isokinetic testing.

Principles of muscle conditioning - The ~~The two~~ two basic principles of muscle ~~testing~~ conditioning are:

- Overload
- Specific adaptation to imposed demand (SAID).

- Overload - The muscle ~~muscle~~ must be overloaded in order to gain increases strength, power and endurance.

A muscle can be overloaded by:

↑ the speed of movement
↑ sing resistance
↑ the no. of repetition
altering range of motion

A ~~high~~ low resistance and high repetition regimen should be used initially.

- SAID :- The aim is to adapt the individual to the performance demands.

The specificity of function means that in the more advanced stages of rehabilitation.

Components of muscle conditioning.
- muscle power
- muscle endurance
- muscle strength
- muscle re-education.

muscle strength can be ↑sed by isometric exercise, isotonic exercise and isokinetic exercise.

→ flexibility - following injury the flexibility is decreased by pain, spasm and swelling.
Adequate soft tissue extensibility after injury is essential for pain free tissue.

Stretching is used primarily to regain musculotendinous flexibility.

Joint Range of motion is frequently decreased in associated pain

→ Musculotendinous flexibility :- Lack of flexibility may be associated with injuries. stretching is done for rising flexibility

For effective stretching some stretching techniques are used:

Ballistic stretching: involves rapid application of force in a repeated and bouncy manner.

→ Neuromuscular control (Proprioception & balance)

Proprioception describes nerve impulses originating from the joints, muscles, tendons and deep tissues.

In acute and overuse injury nerve endings and nerve pathways are damaged. This may result in impaired balance and rised coordination.

In neuromuscular training improvement the proprioception ~~and~~ balance is improved and re-educated

Proprioception and balance exercises should be performed. Equilibrium and non-equilibrium exercise is taught.

Balancing on the rocker board or disk should commence with two legs, than one leg only.

→ functional exercises - functional exercises prepare the athlete physically and mentally for the demand of sports.

Basic functional activities such as walking, jogging, striding etc. commence early in the rehabilitation.

Agility drills is practised

→ Sport skills.

Once adequate strength, flexibility and proprioception have been regained, those components must be combined to perform the relevant sports skill.

During this sport skills phase of the rehabilitation program, careful attention must be paid to correct form and technique.

constant repetition is required as part of the relearning process.

→ Correction of Biomechanical abnormalities.

Biomechanical abnormality is a predisposing factor to injury. especially in overuse injury.

If abnormal mechanics is contributing to an injury, its correction is a vital part in rehabilitation.

Abnormal mechanics may be due to a structural abnormality, such as genu valgum, or secondary to muscle weakness, muscle imbalance or incoordinate @ action.

A number of treatment methods are available for the correction of these abnormalities. They include:

- muscle stretching
- strengthening
- Motor re-education
- Shoe modification
- Padding
- Taping
- Orthoses

→ Cardio vascular fitness.

The rehabilitation programe is designed to enable cardiovascular fitness

In injuries to the lower limbs that require a period of restricted weight-bearing activity, cardiovascular such as cycling, swimming or water exercise.

- Deep water running – Also known as aqua running..

It consist of stimulated running in the deep end of a pool by flotation device.

The water level should be at the shoulder level.

- Hydrotherapy – Hydrotherapy done for relief pain, spasm and swelling.

Hydrotherapy increase the muscle strength endurance and power.

Range of motion exercise, Isometric exercise isotonic exercise can be performed.

→ Psychology – When athletes are recovering from injury, their focus disturbs due to pain and fear about future consequences

In rehabilitation high self esteem and good concentration is developed
Anxiety and depression issues are also treated.

PROLAPSED INTERVERTEBRAL DISC (PIVD).

PIVD also known as disc herniation or herniated disc. It is a condition in which the central gelatinous part of the IV disc moves out from its position.

It is usually a consequence of gradual changes in the disc which ultimately lead to its collapse.

The commonest level of disc prolapse is between the 4th & 5th lumbar vertebrae in lower back and cervical vertebrae in C5 – C6.

When frequently a minor movement such as bending over to pick up an object off the floor, may cause such an apparantely severe injury.

L5, S1 disc is ~~main~~ commonly prolapsed & L4, L5 the next most prolapsed.

→ Stages of PIVD

1. Stage I – Disc bulging or protrusion
2. stage II – Prolapsed disc
3. Stage III – Extruded
4. stage IV – Sequestrated.

1. Stage I – This refers to some eccentric accumulation of nucleus with slight deformity of the ~~an~~ annulus

2. Stage II – Prolapsed disc is the one is eccentric nucleus produces a definate deformity as it works with the fibers of the annulus.

→ Stages of PIVD.

1. Stage I - Nucleus degeneration.
2. Stage II - Stage of protrusion
3. Stage III - Stage of extrusion
4. Stage IV - Stage of sequestration

1. Stage I - Nucleus degeneration.

Degenerative changes occurs in the disc before displacement of the nucleus. These changes are:
i) softening of the tissues.
ii) weakening and degenerative of the annulus.

2. Stage II - Nucleus displacement.

When the annulus becomes weak, the nucleus tends to bulge through the defect. This is called disc Protrusion

Finally the ~~annulus~~ nucleus comes out of the annulus and lies under the ligament.

3. Stage III - Stage of extrusion.

Here the nucleus comes out of the annulus and lies in the ligament, though it has not lost contact with the parental disc.

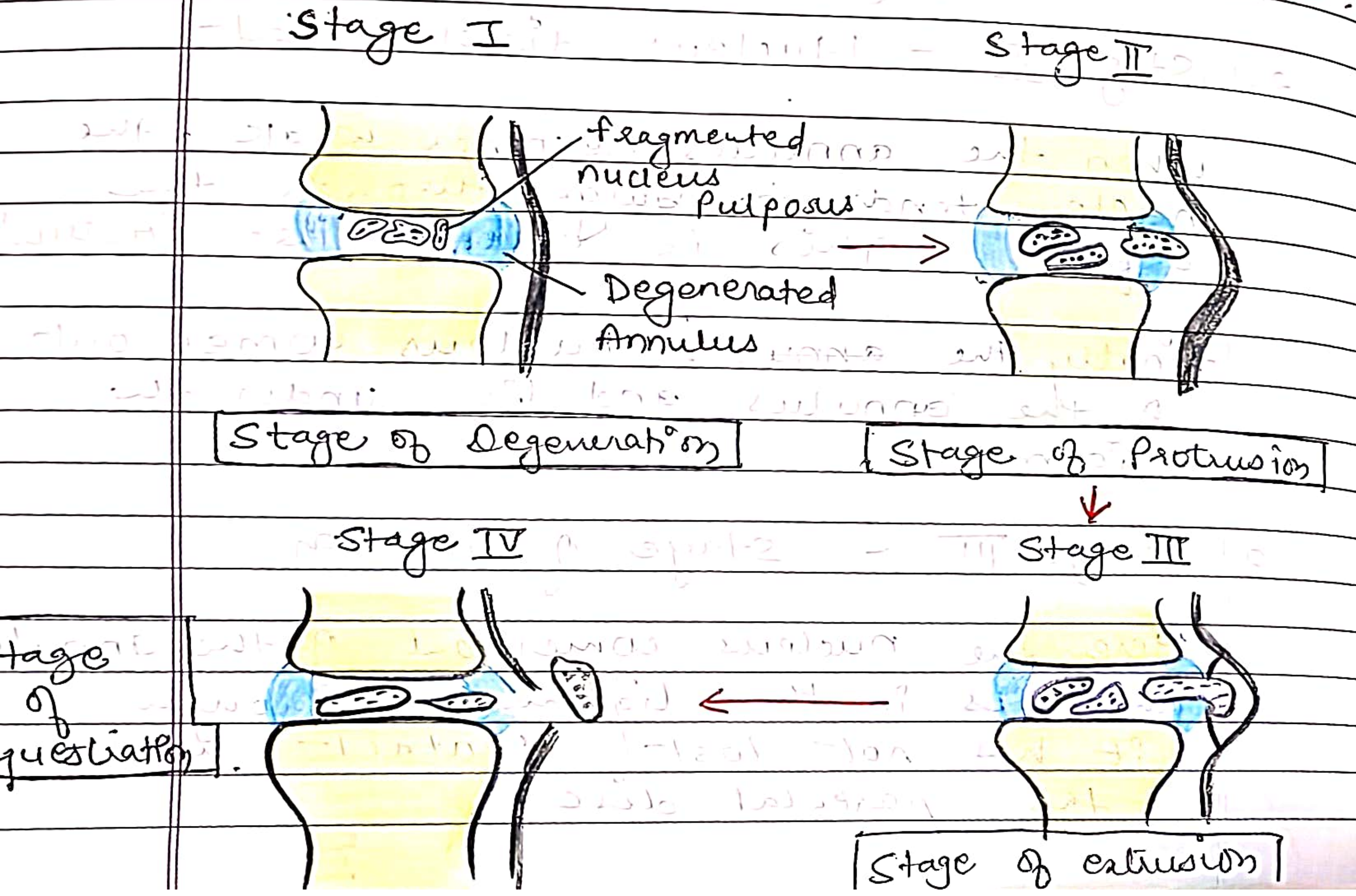
This is called disc extrusion.

4. Stage IV – Stage of sequestration.

Once extruded, the disc does not go back.
The ligament is not strong enough to prevent the nucleus from ~~produ~~ protruding further.

The extruded disc may loose contact with the parental disc.

When it is called sequestrated disc.



→ Causes / Etiology of PIVD.

- So it can be congenital
- Heavy manual laborer
- Sometimes playing sports like football,
- weight-lifting can cause strain.
- Repetitive lifting and twisting.
- Postural stress
- Obesity.
- Inadequate strength of trunk.

→ Clinical features.

- Low backache - Back pain radiating to the buttocks and decrease in rest.
  Pain is ↑ by flexion, sitting, sneezing and coughing.
- Radiculopathy - The radicular pain from the nerve root compression due to herniated disc is evidence by leg pain.
  - Tingling
  - Numbness
  - Burning sensation.

→ Symptoms of PIVD.

1. Lower Back / Lumbar Herniated Disc symptom
   - Severe low back pain.

- Pain radiating to the buttocks, legs and feet.
- walking can be painfull.
Muscle spasm.
Loss of bladder and bowel control.

2. * Cervical herniated Disc Symptoms.
- Arm muscle weakness
- Deep pain near or over the shoulder blade on the affected side.
- Neck pain along with spasm.
- Pain worse in coughing, & laughing.
- Burning pain radiating to the shoulder, upper arm, forearm & fingers
- Tingling or numbness in one arm
Overactive reflexes.
Sharp shooting pain.

→ Examination

The back and limbs are examined with patient undressed.

- Posture - The trunk is tilted to one side (scoliosis)

- Movements - The patient is unable to bend forwards because of the spasm in paraspinal muscles.

- Tenderness – Tenderness in lumbar – sacral region.
- SLRT – Indicates nerve root compression.
- Neurological examination – for motor weakness, sensory loss, loss of reflexes.

→ Investigations – X ray, CT scan, MRI

→ Special test.

- Straight leg raise 30° flexion.
- Slump test – To begin the test, the patient seated with hands behind back to acheive a neutral spine. The patient slump forward at the thoracic and lumbar spine.
If the patient does not feel pain, then patient flex the neck by placing the chin on the chest and then extending one knee as much as possible.

If the patient is unable to extend the knee due to pain, the test is +ve.

- Prone lying knee flexion (Reverse SLR)

→ Treatment -

- Conservative treatment - Best rest
  NSAID'S
  Muscle relaxant
  Anti - depressant - drugs

- Physiotherapy management - • Cryotherapy
  • thermotherapy
  • IRR
  • US
  • SWD
  • TENS ~~to~~ effective in acute & chronic pain.

- Traction -
It is a form of treatment for low backpain.
It stretch the spinal muscle, nerve, ligament and then reduces inter disc pressure. It strengthen the spinal curve.

- Surgical treatment - Discotomy, Laminectomy, foraminotomy.

WHIPLASH INJURY.

whiplash injury is that injury resulting from sudden accelerated and deaccelerated force on the neck.

The term accompanies various issues affecting muscle, joint, bone, ligament, disc and nerve.

It is neck injury due to forceful rapid back and front of the neck.

It is caused by recent car accident but can also result from sports accidents, physical abuse, trauma or fall.

→ Causes

whiplash injury typically occurs when your head is forcefully and too quickly thrown backward and forward.

.whiplash injury may result from:-
- RTA
- Physical Abuse – Punched, pushed & fall
- sports – football and other sports.

→ Pathology.

whiplash injury are considered to be minor soft tissue based injuries with evidence of fracture.

The injury occur in three stages:

- Stage I – The upper and lower spines experience flexion in stage 1.
- Stage II – The spine assumes an S-shape while it begins to extend and eventually straighten to make the neck lordotic again.
- Stage III – shows the entire spine in extension with an intense shearing force that cause compression of the facet joint – capsules.

→ Symptoms –
- Neck pain and stiffness
- loss ROM in neck
- Headaches
- Tenderness
- Pain in the shoulder, upper back & arm
- fatigue
- Dizziness.
- Tingling and numbness in the arms.

→ Complications –
- Severe neck pain.
- Paralysis.

→ Examination –
- ROM of neck & shoulders
- Tenderness
- Reflexes
- Muscle strength
- Sensory Examination
- Dermatomes & myotomes

→ Investigation –
- X Ray
- CT scan
- MRI

→ Treatment –

- Conservative treatment –
  - cervical collar
  - Ice therapy first 24 hours
  - Muscle relaxants.
  - NSAID's
  - Lidocaine for pain

- Surgical treatment – – The type of surgery depend upon what part of your neck have been injured, ruptured or herniated disc.

Discotomy is performed to remove damaged disc.

→ Physiotherapy management –

- Needling and accupuncture for pain
- Muscle tension relief.
- Electrotherapy – US, TENS
- Strengthen the neck muscle
- Improve neck posture, proprioception and motor control.
- Joint mobilization

Kissing Spine

- Kissing spine also known as Baastrup's spine
- Kissing spine is characterised by degenerative changes of both the spinous process and interspinous process soft tissues of two labelling vertebrae.
- Kissing spine also known as interspinous bursitis.
- In Baastrup's syndrome; Pain and inflammation are triggered when the spinous processes of two adjacent vertebrae touch each other – This is how the disorder earned the nickname "kissing spine"
- Baastrup's sign commonly occurs in the lumbar spine with the $L_4 - L_5$ segment.

→ Causes – The cause of kissing spine depends upon the risk factors :-

- Traumatic injuries
- Obesity.

- CHD
- Excessive lordosis which results in increased mechanical pressure.
- Repetitive strains of the interspinous ligament.
- Dislocation.
- Spondylitis

→ Clinical features – • Back pain

- Rotation and lateral flexion are painful with flexion.

- Pain upon palpatation of the level of interspinous ligament.

- Midline pain that radiate distal or proximal.

→ Differential diagnosis

- Lumbar spondylsis
- Spondylolisthesis
- degenerative disease of spine
- muscle strain
- cyst
- fracture of spine.

Diagnosis – X Ray, CT scan, MRI

1) Quebec Back pain disability scale. (written in whiplash injury).

Explain 2) VAS scale.

3) Measurement of spinal mobility.

→ Examination

Examination of kissing spine is verified with clinical and as well as imaging studies - CT scan, X Ray.

Examination is based on symptoms observation.

Medical management - - Medical treatment includes reducing pain and inflammation shown in MRI.

If medical treatment does not shows any improvement then surgery is adviced.

Physiotherapy - • strengthening of the core muscles.

- The hip flexors responsible for shaping lumbar spine. ~~stren~~.
- Due to chronic back pain gluteus maximus muscle flexion - ~~ft~~ extension

is reduced. Strengthening of gluteus maximus is done.

- Heat therapy is given for neuro-muscular damage.

- Muscle relaxant technique is applie

* SI JOINT DYSFUNCTION.

SI joint dysfunction is a term used to describe the pain of the sacroilliac joint.

It is usually caused by abnormal motion or malalignment of the SI joint.

Sacroilitis is not the same as SI joint dysfunction. Sacroilitis is an inflamma-tory condition.

→ Causes :-

Pregnancy - Due to weight gain SI joint pain is felt.
In pregnancy hormonal changes causing ligaments in SI joint to relax (hypermobility) and pelvis changes associated with childbirth.

hypermobility - When the ligaments that connect the sacrum to the pelvis are too loose, this can lead to instability and ~~to~~ hypermobility of SI joint.

Injury - A forceful impact from incidents such as direct fall onto the buttocks, car accidents, or sports injuries

cause:
Can strain

Degenerative joint diseases such as arthritis can cause ~~[illegible]~~ deterioration of the SI joint.
Arthritis can lead to the wearing down of the cartilage, that typically reduces friction in the cartilage leading to SI joint dysfunction.

Ankylosing spondylitis is a chronic inflammatory disease that causes inflammation b/w vertebrae and facet joints and between the spine and pelvis. It may lead to SI joint fusing.

uneven leg length - uneven leg length ~~to~~ can place uneven pressure on the one side of the pelvis causing wear and tear of ligaments.

Prior back surgery - Prior back surgery which can displace pressure to the SI joint.

→ Symptoms - • Low back pain to one side
• Pain spreading to the hips, buttocks, and thigh.
• Sciatic like pain in the buttocks & hip.
~~stiffness and~~ reduced ROM ~~in the~~.

- stiffness – in lower back, ~~this~~ hips, thigh, groin.
- Reduced ROM in lower back, hips, pelvis, groin.
- worsen pain in climbing stairs, running, jogging.
- Instability to the pelvis.

→ Assessment:

- Palpation – SI joint – palpation is done for assessing tenderness and pain.
- ROM and symmetry is assessed.
- Special tests

1) ~~Gaenslen~~ Gaenslen's test –
2) FABER –
3) Thigh thrust –
4) ASIS distraction
5) sacral compression.

→ Diagnosis – X Ray, CT

→ Treatment – NSAID's

FABER test –
diagnosis of pathologies at the hip, lumbar & sacroilliac joint.
– flexion, Abduction, ER or figure of 4 test.

PT management

Core stability exercises
Lumbar stabilization exercise
· Isolated lumbar stabilizing training
Manipulation - SI joint.
Stabilization done by pelvic belt.
Modalities for pain relief.

* FACET JOINT SYNDROME

facet joint syndrome is a condition in which the facet joint of the spine become the source of pain.

It is caused due to degenerative changes to joints between the spine bones.

The cartilage inside the facet joint can break down and become inflamed, triggering pain signals in nerve endings.

Causes - Repetitive movements
Previous injury.
Obesity
Poor Posture
Spinal conditions
Elderly persons
facet pain after whiplash injury

Sublaxation of the facet joint leading to spondylolisthesis.

→ CF – The symptoms are commonly unilateral.

Cervical facet syndrome symptoms.
- Axial neck pain
- Pain limitting extension and rotation
- Tenderness upon palpation
- Radiating pain into the shoulders and then radiate down an arm or fingers

Lumbar facet joint syndrome symptoms
- Pain or tenderness in back
- Stiffness along the spine
- Pain on hyperextension
- Referred pain appearing down on legs.

→ Differential diagnosis

- Sciatica
- RA
- Osteophytes
- Lumbar radiculopathy
- Sacroilliac impingement
- Disc herniation
- Compression fractures
- Myofascial pain.

Schober's test is done if there is ↓ in lumbar spine ROM.

→ Diagnosis – X Ray, CT Scan, MRI

→ Physical Assessment –

- Schober's Index
- VAS scale
- Lumbar spine rotation.
- Inspection – Evaluation of paraspinal muscle or asymmetry. ↑sed or ↓sed lordosis. Posture is inspected
- Palpation – tenderness, Pain
- ROM
- flexibility
- Sensory Examination
- Muscle stretch reflexes
- Muscle strength.

→ Treatment –

- Conservative – NSAID's, weight loss, muscle relaxant.
- PT management – • Reducing lumbar lordosis
  - Pelvic tilt exercises
  - Pain relief

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Spinal manipulation therapy
Heat - therapy
Cryotherapy
Stretching
Strengthening

* PIRIFORMIS SYNDROME HIP

Piriformis syndrome is a painful musculo-skeletal condition, characterised by a combination of symptoms including buttocks & hip pain.

Piriformis syndrome is caused when the piriformis muscle compresses the sciatic nerve.

Causes - • Inflammation in the piriformis or the tissues around it.
• Muscle spasm.
• Scarring in the muscle
• Macrotrauma to the buttocks
• PS may be caused by shortening of the muscles due to alterations of limbs.
• Myofascial trigger points.
• Myositis Ossificans of the piriformis muscle
• Hypertrophy of the Piriformis muscle.

→ Cf — • Radiating low back pain
• chronic buttock pain
• numbness
• Paraesthesia
• Difficulty in walking
• Limited SLR
• sciatica
• Burning deep sensation

→ Difference b/w piriformis syndrome

Although both conditions ~~are same~~ affect sciatic nerve, but they are different

A herniated disc or spinal stenosis can cause sciatica.

Piriformis syndrome only involves the piriformis muscle or pressure on one area of the sciatic nerve in the buttocks.

→ Diagnosis

CT scan, X-Ray, MRI

→ Investigation

Observation of piriformis muscle with shortening of limb.

- SLRT — Painful flexion – adduction –
- FAIR — IR
- Hip abduction test –
- Trendelenburg sign — Assist the hip dysfunction

→ Treatment –

NSAID's
Muscle relaxant –

→ PT management –

Manipulative treatment
US
Soft tissue mobilization
Piriformis stretching
Hot pack & cryotherapy
Myofascial release
muscle strengthening.

✳ ITB SYNDROME

ITBS is a common knee injury that usually presents with pain / tenderness on lateral aspect of knee.

It is an overuse injury.

Illitibial band is a thick band of fibrous tissue that runs along the outside of your leg. (laterally).

→ Causes -

- Excessive foot pronation - your foot naturally rotates outward.
- Hip abductor weakness - A weakened ability to rotate the hip might cause ITB tense.
- Medial compartment arthritis leading to genu varum - genu varum causes your knee to spread when your feet touch your ankles. This pulls ITB tightening.

→ Who does ITBS affect -

- Basket ball players
- Cyclist
- Hockey players
- Skiers
- Bowed legs
- Knee arthritis.

→ Clinical presentation

- Repetitive activity involving flexion and

and extension cause burning pain.

- Sharp pain on outer aspect of knee and when the heel strike the ground that can radiate into the outer thigh or calf.
- The pain tends while running or coming down the stairs.
- Tenderness over lateral femoral epicondyle
- Inflammation over " "

→ Differential diagnosis

- Biceps femoris tendinopathy
- Myofascial pain
- LCL injury
- Menisci injury
- Popliteal tendinopathy
- Overuse injury.

→ Investigations

CT scan
X Ray
MRI

→ Special test

1) Renne's test / Noble compression test

It was developed in 1975 to test for ITB syndrome.

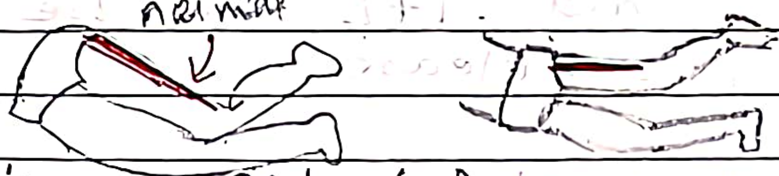
This test is done when the patient complains of lateral knee pain and sometimes crepitus when running.

Palpation - Patient sits on knees while you palpate the ITB just above the lateral femoral epicondyle.

The patient is instructed to place one hand on the examiners shoulder for balance and slowly squat from one leg to 60' - 90' flexion and then rise back up.

Palpation is done to feel crepitus. Palpatory crepitus or pain at the lateral femoral condyle are positive sign for ITB syndrome.

2) ober test -



patient position - Side lying, affected limb above.

test - The knee is flexed 90° and hip abduction and extension. The patient is instructed to adduct the thigh, &

The test is positive if the patient cannot adduct.

→ Medication – NSAID's
Analgesics

→ Physical therapy.

a) for pain, swelling – • Cryotherapy or heat
• taping
• stretching.
• Ultrasound therapy.
• Muscle stimulation

• Iontophoresis with dexamethasone as an anti-inflammatory modality.

Exercise therapy – • Stretching.

• Myofascial treatment – effective in reducing the pain. The trigger points in BF, vastus lateralis, Gluteus maximus and TFL can be released by myofascial release.

• Bridging
• Side lying hip abduction
• Side plank
• Passive movement

* ACL INJURY :

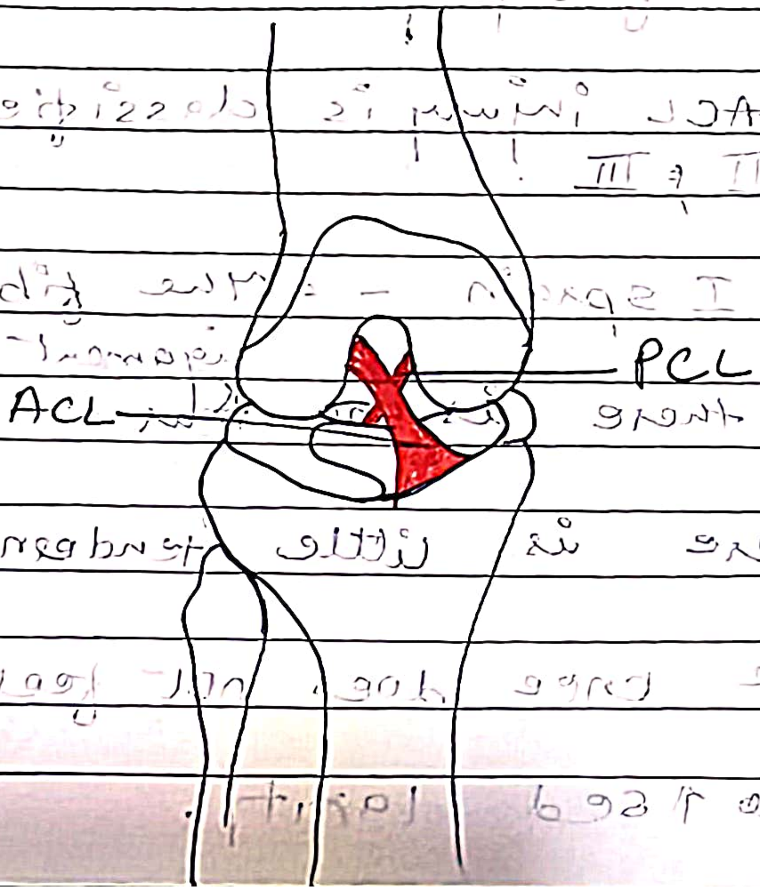
ACL injury occur most frequently in those who play sports involving pivoting.

→ Anatomy – The ACL band cources from the femur to tibia.

The collateral ligaments are found on the sides of your knee. The MCL is medially and .

The cruciate ligaments are found inside your knee joint. They cross each other to form an X.

The Anterior cruciate ligament runs diagonally in the middle of the knee.



→ **Causes** – The anterior cruciate ligament can be injured in several ways:

- changing direction rapidly
- stopping suddenly.
- slowing down while running.
- Landing from a jump incorrectly.

non contact ACL injury.

- Side step cutting.
- Decelarating from running without changing direction.
- Decelerating from running with change in direction
- Jumping

→ **Grades of Injury..**

The ACL injury is classified as grade I, II & III.

Grade I sprain – • The fibers of the ligament are stretched but there is no tear.

- There is little tenderness & swelling.
- The knee does not feel unstable.
- No ↑sed laxity.

Grade II sprain - • The fibers of the ligament are partially torn with hemorrhage.

• There is little tenderness and moderate swelling with some loss of function.

• The joint may feel unstable.

• Painful and pain increase with Lachman's & Anterior drawer stress test.

Grade III sprain - • The fibers of the ligaments are completely torn.

• There is tenderness, but limited pain.
• There maybe a little or severe swelling.
• The knee feels unstable.

An ACL avulsion occurs when the ACL is torn away from either the femur or the tibia.

Clinical presentation

• There maybe audible pop or crack sound at the time of injury.
Knee unstability.
Swelling of the knee.

Restricted
Mild tenderness
Tenderness at the medial side of the joint.

~~Diagnosis~~

Risk factors :- • Participating in certain sports such as soccer, football, basket ball or gymnastics.
• Being female - females are more prone to ACL injury due to differences in anatomy & muscles strength
• Poor conditioning
• faulty movement patterns
• wearing foot wear that doesn't fit properly.

Diagnosis - X Ray - X Ray shows ligament injury.

• MRI
ultrasound may visualise internal structures such as muscles and ligaments

Assessment – – Physical assessment which includes the following tests :

a) Lachman test – This test is ~~do~~ performed to identify the integrity of the ACL.

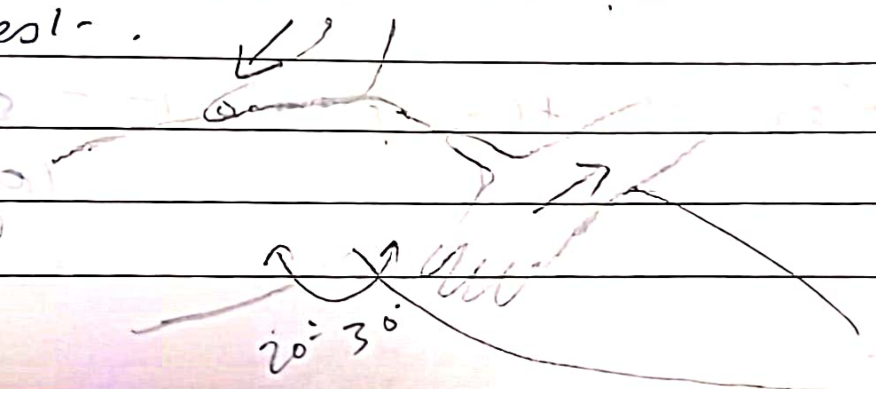
Lie the patient supine on the bed. Place patient's knee in about 20-30° flexion.

The Examiner should place one hand behind the tibia and other hand on thigh.

The therapist thumb should be on tibial tuberosity.

On pulling the tibia anteriorly, the ACL should prevent forward translational movement of the tibia on the femur.

If the Anterior translation of the tibia is present with a end feel then it indicates positive test.



b) Anterior drawer test:

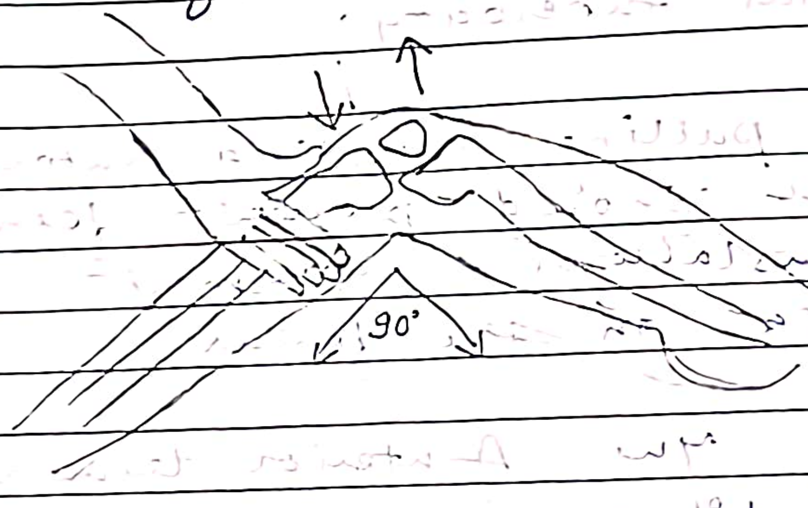
Position of patient - supine.

The patient should flex hip to 45°, knee to 90° and feet flat.

The Examiner sits on the toes of the tested extremity to stabilize it.

The examiner grasps ~~tibia~~ just below the tibiofemoral joint line and then attempts to translate the lower leg anteriorly.

The test is positive if there is lack of end feel.



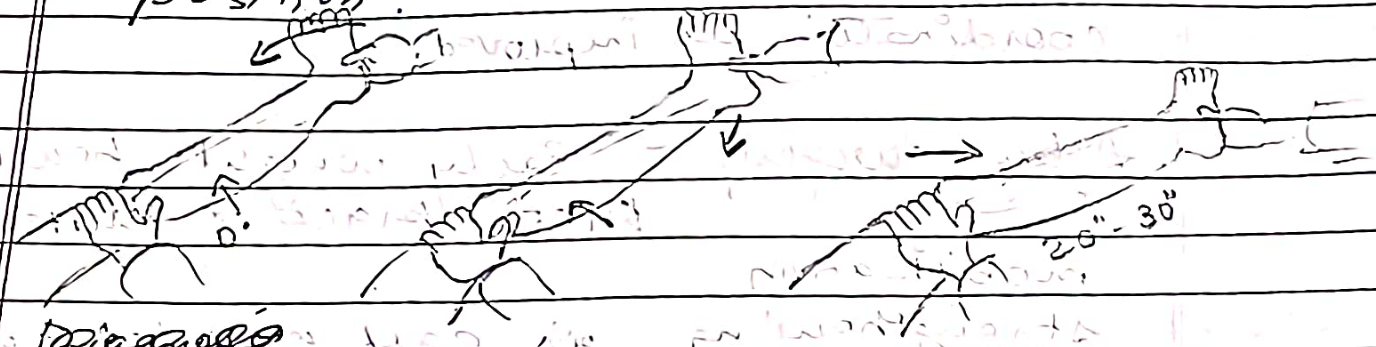
c) Pivot shift test:

Position of the patient - supine with legs flexed.

The examiner grasps the heel of the involved limb/leg.

The Examiners opposite hand placed laterally on the proximal tibia just distal to the knee.

The examiner then applies a valgus stress and a load while internally rotating the tibia as the knee is moved into flexion from fully extended position.



Management :- RICE protocol for pain and swelling.

NSAID's

PT management :-

In acute stage - SLR
Static exercise
Patellar self mobilisation.
Passive knee extension
Passive knee bending.
Ankle DF & PF movement.
weight transfering.
gluteal exercise in prone.

Pre-surgery stage – The focus is on strengthening and proprioception.

RICE & Electrotherapy is applied for several weeks to obtain full range of motion.

Gait pattern is improved. thus, it helps to regain faster motion after ~~injury~~ surgery.

coordination is improved.

After surgery – Early weight bearing.
Knee brace & crutch.
mobilization
strengthening of calf muscle, hamstring, quadriceps
Isometric of knee.
Resisted exercise
ADL activities.

surgery for ACL injury – knee arthroscopy
ACL reconstruction

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* OSTEOCHONDRITIS:

Osteochondritis is an idiopathic disease which affects the subchondral bone and its overlying articular cartilage due to loss of blood flow.

This may result in seperation and instability of a segment of cartilage ~~and free movement~~

Etiology - • Osteochondritis can be developed in childrens and Adults

- In childrens the affected bone and cartilage heal on their own.
- In Adults, the lesions have a greater ~~sepeart~~ seperating from surrounding bone and cartilage.
- The actual cause is unknown.
- It can arise as a result of direct trauma. Due to trauma the tibial plateau could damage one of the condyles of the femur.
- Repetitive micro trauma ~~ chemical changes at the surface of the subchondral bone.

- genetic conditions
- growth disorders
- Ischemia
- Hereditary factors.

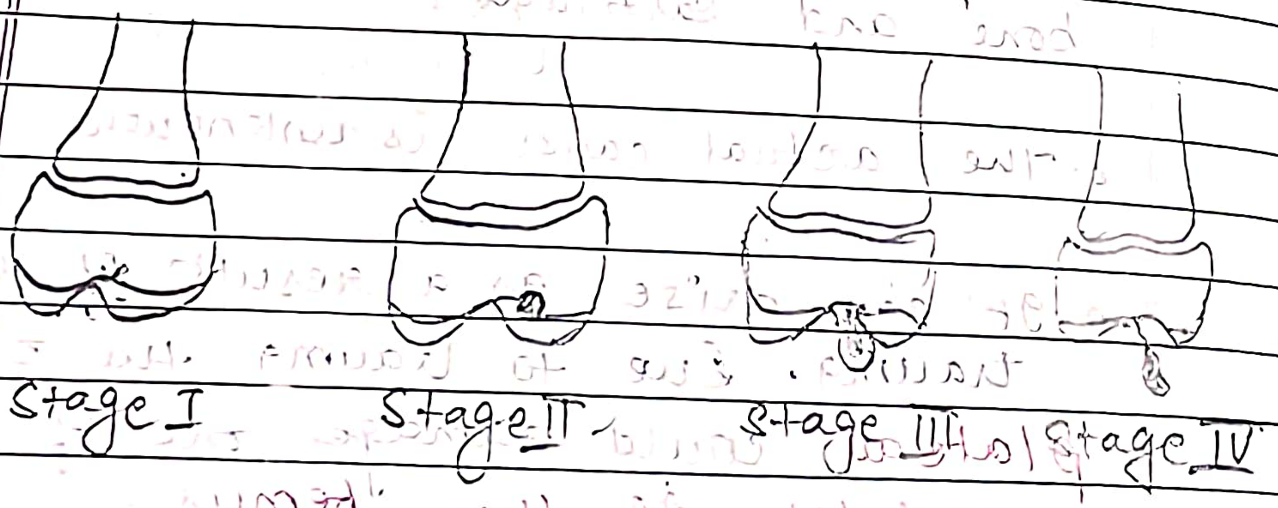
Stages of Osteochondritis.

Stage I – Ischemic osteonecrosis begin in a part of a subchondral bone because of low vascularisation.

Stage II – A fully subchondral osteonecrose.

Stage III – Partially seperated lesions

Stage IV – loosening of the affected bone fragment and the related cartilage.



C/F - ⇒ Pain - • Pain triggered by physical activity.
• Pain in walking upstairs, playing spor stabbing pain.

Swelling and tenderness - skin around joint affected.

Instability of joint.
Joint popping or locking - The knee cannot be stretched but remain bent. The is locked because the bone fragments is located b/w the bones of knee join and stick to each Other.

Joint weakness
↓sed ROM - unable to straighten the knee.

Quadriceps muscles atrophy is seen.
Gait deviation is seen.

Examination

The knee feels warmer than the non-injured knee.
Swelling is palpable
Quadriceps muscle atrophy.
The passive and active extension of the knee is limited.

locking of the knee.
Wilson's test – The knee is held in 90° to 30° from full extension while rotating the tibia. The test is positive when internal rotation is painful.

Diagnostic imaging

MRI – to detect the location and size of the lesion.

Management :-

Medical management – Rest
Stop activities for 3-6 mos.
Immobilization of the knee for couple of weeks.

Surgical management – Retro grade operation.
Excision of bony fragments
Arthroscopy.
Stabilization of the fragment by fixation.
Osteochondral autograft transplantation.

PT management – The goal is to pain reduction, promote repair and prevent degeneration of of the surface of the knee joint.

Immobilisation – 12 week of immobilisation is needed.
· sports activities should be stopped temporarily.

Therapy – · stretching improve ROM.
· strengthening exercise
· closed chain exercise
· SLR
· Ankle band exercises
· strength training
· Casting for quadriceps and hamstring
· Muscle stimulater for quadriceps and hamstring. followed by strengthening
· Gait rehabilitation.
· knee proprioception is improved.

* CHONDROMALACIA PATELLAE.

Chondromalacia patellae (CMP) is referred to as anterior knee pain due to the physical and biomechanical changes.

The articular cartilage of the posterior surface of patella is going through degenerative changes which manifest as softening, swelling, and erosion of hyaline cartilage underlying the patella and sclerosis of the underlying bone.

Etiology – • injury.
• Abnormality in the Q angle
An ↑se in Q angle is caused by lateral pull on the patella.

• Muscle tightness – Rectus femoris
TFL
Hamstrings.
Gastrocnemius.

• Degenerative causes of the articular cartilage
– Overuse injury.
– Repetitive microtrauma
– Inflammatory condition like OA.
– Postural distortion.

Stages of the Disease

Stage I - Softening and swelling of the articular cartilage due to injury.

Stage II - blister formation in the articular cartilage

Stage III - fragmentation ~~and~~ of cartilage

Stage IV - ~~Osteoph~~ erosion is formed in the subchondral bone. Osteophyte formation occurs in this phase.

Cf - Anterior knee pain
Pain Aggrevated by running, stair climbing, squatting and kneeling.
Tenderness under the medial or lateral border of patella.
crepitus
swelling
High Q angle
Vastus medialis muscle weakness.
quadriceps weakness.

Diagnosis - X Ray - AP view.

Examination - • Observation - slight effusion is seen.

• Mobility - Painless movement but repeated extension of the knee from flexion will produce pain.

• feel - Pain and crepitus will be felt
tenderness can be felt medially.

Tests

• Patellar grind test - A positive sign on this test is pain in patellofemoral joint.

• Compression test.

• Extension resistance test - test done for extensor (m) (quadriceps femoris). The test is true if the patient knee does not hold the resistance.

Medical management - NSAID's

PT management - Needling
accupuncture

Stretching of hamstring, quadriceps, gluteal (m) and gastronemius muscle.

Isometric quadriceps strengthening.
strength training of quadriceps.
Isotonic exercise
CKC movements.
Patellar taping.
foot orthosis
Stability training.

* SWIMMER'S KNEE.

Knee pain is caused mainly during breast stroke swimming.

Repetitive stress is placed on the medial knee produces pain during the whip-like motion.

The breast stroke kick is a high valg load produced during sudden flexion and extension, Add. and ER. of the knee against the hydrodynamic movem result in stress to the medial compa

Hence a strain occurs to the medial collateral ligament and compression to the lateral knee.

Cause - hypermobility during swimming
Poor technique in inexperienced Swimmers.
Overuse injury of knee.

Symptoms - • Pain in the knee which worsen during physical activity.
• Swelling and reduced joint mobility.
• Tenderness.
• Strain to MCL.
• (M) spasm.
• limited ROM.
• Reduced knee strength.
• Pain with direct use of the quadriceps
• and knee (eg. swimming).

Diagnosis - X Ray.
MRI for MCL injury.
Ultrasonography.

Examination - valgus stress test at 20° of flexion.
→ MMT done for muscular weakness.

Treatment - NSAID's

PT - The goal of physiotherapist are:
• ↓ knee pain
• speed recovery.
• optimise healing
• strengthen the (m) around knee.

Therapy - RICE protocol. (Explain).
Dry needling.
Restoring ROM.
Isometrics

Taping done for knee stability.
US, & Massage for good circulation
Soft tissue mobilisation.
Strengthening of quadriceps and hamstring include exercise
- Squats
- hinges
- Dead lifts

Electrotherapy - TENS, US.

* PATELLOFEMORAL PAIN SYNDROME.

It is also known as Runner's knee & Jumper's knee.

Patellofemoral Pain Syndrome (PFPS) is a pain arising from patellofemoral joint itself or surrounding ~~surro.~~ structures

It is referred to as anterior knee pain

PFPS occurs when nerves sense pain in the soft tissues and bone around the knee cap.

Causes - • Overuse injury caused by physical activity such as jogging, squatting.

- use of improper equipments.
- changes in footwear or playing surface
- Patellar malalignment
- Muscular imbalance or weakness at the quadriceps m.
- knee hyperextension.
- genu valgum or varus.
- ↑sed Q angle
- tightness of ITB, Hamstring, gastronemius
- Sometime the cause can be :- Pes planus
  Pes cavus
  Repeated foot pronation

CF - Pain during exercise &
Pain during ~~etc~~ activities such as climbing, running.
Pain in sitting for a long period of time.
Crepitus heard during movement.

Risk factors - Age - Commonly affects teen and young adults

Sex - Womens are more likely as men to develop PFPS Because of womens wider Pelvis.

Certain sports - Running & jumping sports can put extra stress on knees

Diagnosis - X Ray, CT scan, MRI and ultrasound.

Examination - VAS scale.
Pain when sitting with flexed knee.
Pain while sitting with legs crossed.
Pain walking down hill.
Tight quadriceps and ITB is observed By MMT.
Pain while wearing high heels.

Management - Pain relievers.

PT management - - Manual therapy.
Open & close KC
Patellar taping for reducing pain
Gait retraining
Joint mobilisation.

Exercise therapy

- quadriceps strengthening - Isometrics while the knee is fully extended. It can minimise pain.
SLR.
Pillow squeeze exercise. - Patient sits comfortable with his trunk supported. Both knee extended. Put a pillow or towel under one knee. Patient tries to push the pillow in the table.

• Hip training – Strengthening of hip abductors and lateral rotators.

• Proprioceptive training – Due to pain proprioception is ↓.

• Electrotherapy – Electrical stimulation for VMO & VL.
Ultrasound for knee pain
Hot pack for knee.

LEG & ANKLE

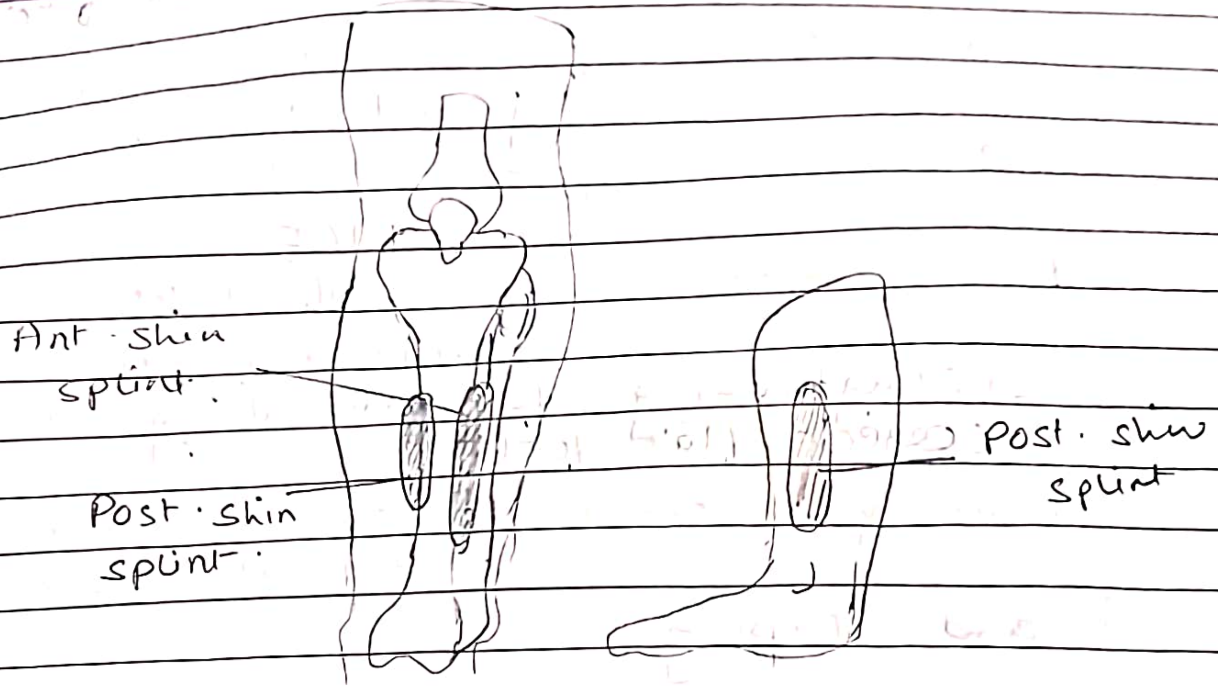
SHIN SPLINTS

Shin splint also known as Medial tibial stress syndrome.

It is common overuse injury of the lower extremity.

It typically occurs in runners and jumpers

Shin splints refer to exercise induced leg pain that usually occurs in the middle or bottom 3rd on the inside of the shin.



lack of calcium in body. (overuse

Causes — • Repetitive stress on the tibia.
• Having flat feet.
• Exercising with improper or worn out foot wear. — Biomechanics alter.
• Excessive running or dancing can cause stress.
muscle imbalance

CF - Pain — • inner part of the lower leg or front of the shin
• mild swelling on the shin bone
• Tenderness is seen.
• Tight Achilles tendon
• Dull ache in the front part of the lower leg.

Diagnostic procedures — Bone scan
X Ray.
MRI
CT scan

Test – s... palp... ...muscle and bone. Any pain + the test.

One leg hop test – hop 10 times with single leg.

Proactive test – Pain on resisted plantar flexion.

Examination – focal tenderness on the injured area.

Swelling maybe present.

RICE

PT management – Modified weight bearing. Temporary immobilisation.

Strengthening for preventing re-injury.

correct flat foot.

Pain management – US, shock wave therapy, and soft tissue mobilisation and Taping.

Proprioception and balance – It will help to ↑ the efficiency and the reaction of the leg to react to diff. overuse injuries.

Calf muscle tightness reduce.

Anterior tibialis & Posterior tibialis muscle strengthening.

ANKLE SPRAIN.

Ankle sprain is a common musculoskeletal injury that involves the stretch or tear (partial or complete) of the ligaments of the ankle.

Ligaments help stabilize joints, preventing excessive movement. A sprained ankle occurs when the ligaments are forced beyond their normal ROM.

→ Causes – • A fall that causes your ankle to twist.
• Landing awkwardly on your foot after jumping or pivoting.
• walking or exercising on an uneven surface.

→ Anatomy – The most frequently damaged ligament is the ~~Anterior~~ Anterior Talofibular ligament (ATFL)
The mechanism of sprain injury of the ATFL and calcaneofibular ligament (CFL) is when a plantar flexed foot is forcefully inverted.

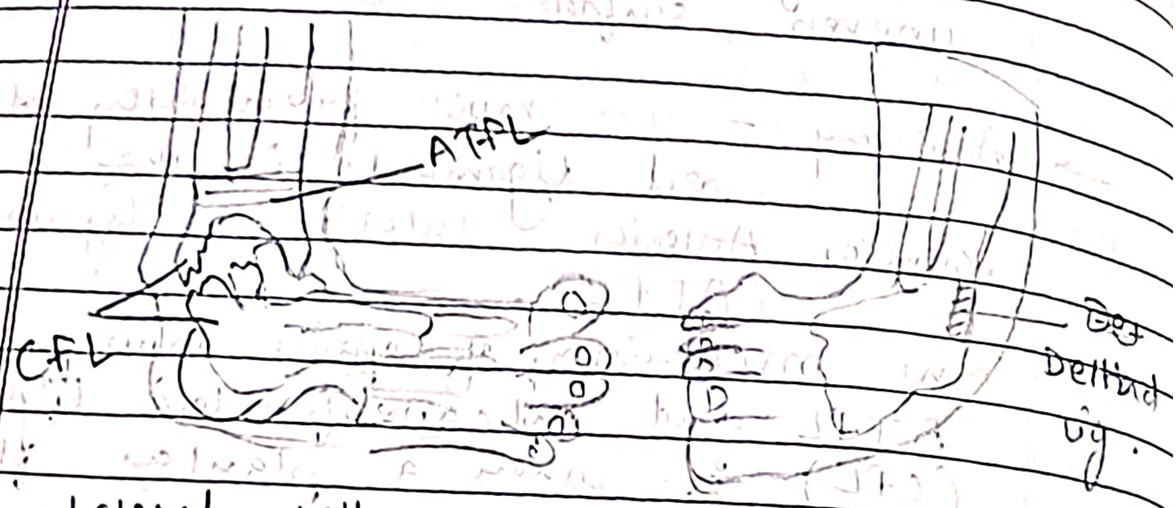
→ Mechanism of injury.

lateral Ankle sprains usually occurs during a rapid shift of body center of mass over the landing or weight-bearing foot.

The ankle rolls outward, the foot turns inward causing the lateral ligament to stretch and tear.

when the ligament ~~lig~~ tears or is overstretched its previous elasticity rarely returns back to normal.

A less common mechanism of injury involves forceful eversion movement at the ankle injuring the strong deltoid ligament.



lateral roll.

C/F – • Pain especially when putting weight on the affected foot.

• Tenderness upon palpation of the ankle joint.

• Bruising, edema and swelling is seen.

• Limitation in ROM and instability at the level of the joint.

• Complains of paresthesia of foot which can due to compromise of peroneal nerve.

Patient seated at the end of the bed or lying supine with ankle joint 10° to 15° of PF, the examiner grasps the heel with one hand and stabilizes the tibia with the other hand. The examiner pulls the heel forward while continuing to stabilise the tibia with other hand.

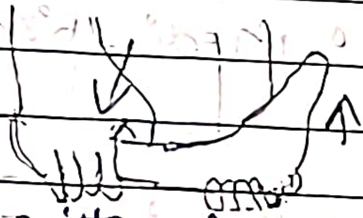
→ Diagnosis – CT scan, MRI.

→ Classification of Ankle sprain

The classification of ankle sprain is based on grading :-

- Grade I – Mild impairment – minimal swelling and tenderness with little impact on function.
- Grade II – Moderate impairment – Moderate swelling, pain & tenderness with decreased ROM and ankle instability.
- Grade III – Severe impairment – Significant swelling, tenderness, loss of function and severe instability.

→ Special tests :- (for ATFL)



- Anterior Drawer test – ~~written in ACL inj~~ till
- Talar tilt test – to examine Anterior talofibular ligament and the calcaneofibular ligament.

[illegible]

[illegible]

[illegible]

- [illegible] test – [illegible]
- [illegible] test – [illegible]

→ [illegible]

RICE [illegible]

- [illegible] – [illegible], [illegible] and [illegible].
- [illegible] – [illegible] with a [illegible] [illegible] might be [illegible], [illegible]. [illegible] recommend elastic [illegible]

ankle brace.

Physiotherapy – PRICE protocol is followed (Protect, Rest, ice, compression, elevation).

Involves resting of Ankle for 72 hours.

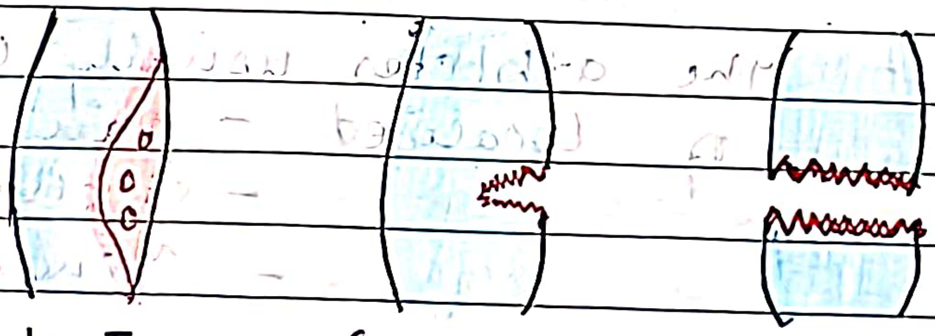
To ↑ stability, active and passive mobilisation of foot and ankle is done.

ROM exercises.

Balance and stability training is done to retrain ankle muscles.

Rehabilitation includes improving muscle strength, load carrying capacity & walking skills.

Modalities used – US, TENS, IFT, Laser



Grade I Grade II Grade III

* TURF TOE SYNDROME

Turf toe is the sprain to the 1st metatarsal phalangeal joint.

Turf toe is a hyperextension, dorsiflexion injury of the big toes 1st MTP joint.

→ causes – Overload on MTP joint in hyper dorsiflexion.

Caused due to running or jumping.

→ CF – The athletes usually complains of localised
- pain
- swelling
- tenderness

The pain is aggrevated by weight bearing or muscle of the big toe.

Stiffness of the 1st MTP joint.

Grading :-

- Grade 1 injury symptoms include - local swelling
  discolouration.
- Grade 2 injury symptoms - Moderate swelling -
  ROM ↓
  pain with movement.
  Partial tear of plantar struct
- Grade 3 injury symptoms - Discolouration.
  Total tear of plantar s
  weakness of hallux flexion
  High instability of MTP joint

→ Examination

- Localised swelling and tenderness of the 1st MTP joint.
- Plantar medial tenderness is seen.
- Passive plantar flexion or dorsiflexi of 1st MTP joint are painful.

Special test - The vertical lachman test is positive.

Treatment –

Medical management – Injection therapy
NSAIDs.

PT – RICE protocol in acute stage

– Grade I injury – • Taping in slight
• plantar flexion.
• limits movement.
• do not excess ROM.

• Gentle passive plantar flexion.
Strengthening exercise

– Grade II injury – • ↑ ROM
• ↓ pain
• Passive joint mobilisation.
• Pulsed US and iontophoresis can be applied to manage inflammation and healing soft tissues.
• Active exercises can be started

– Grade III injury – Non surgical management of grade III requires immobilisation in plantar flexion.

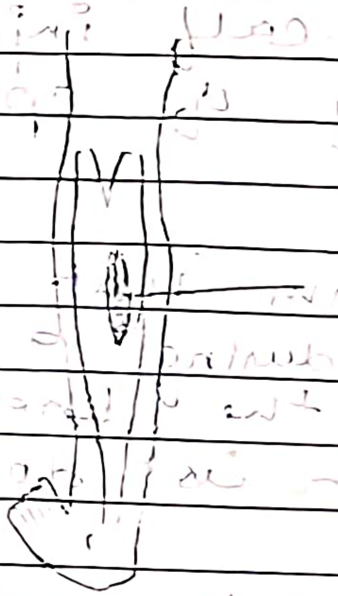
* TENNIS LEG

The tennis leg refers to an acute medial head of the gastronemius muscle tear in the older athlete.

It is characterised by sudden onset of severe calf pain and significant disability.

The injury is associated with extensive bruising and swelling and can be mistaken for a DVT.

The Plantaris muscle is also involved.



→ Causes :-

1) Age/activity status - Commonly occur in middle aged athlete

2) Unstretched muscles - The unstretched muscles often rupture when challenged to stretch.

3) Previous injury - The Athlete with recurrent - calf strain is likely to result in rupture when the muscle is challenged.

4) Common in sports such as basket-ball, Rugby and soccer. These sports require pushing off to jump, sudden change of direction.

→ Sports biomechanics for Tennis leg.

The medial calf injury can happen in a variety of sports or other activities.

One mechanism that occurs is on the back leg during a lunging shot, in which the knee is extended and foot is dorsiflexed.

The action put maximal tension the gastrocnemius muscle, resulting in tennis leg injury.

The common position in the ~~tee~~ tennis stroke, it results in the greatest force to the muscle, but here ~~the~~ the tennis leg can be developed by typical contraction of ankle plantar flexion, especially in the athletes such as pushing or lifting heavy ~~ete~~ weight.

→ Cf – An audible pop sound when the injury to the medial calf is usually reported.

The patient complains of calf pain, radiates to the knee or ankle.

Swollen leg that extends down to the foot or ankle.

Colour changes or bruising in leg that extends downwards.

Tenderness is noted upon palpation in the entire medial gastronemius muscle.

Pain when passive ankle dorsiflexion and resistance to ankle plantar flexion.

→ Diagnosis – diagnostic US, X Ray, MRI.

Physical Assessment – Palpation over calf muscle.
Calf ROM test.
Calf muscle strength test – stand on one leg or perform heel raise.
Gait Assessment.

→ Treatment – NSAID's.

PT – PRICE

- Acute stage Rehab. – Rest
  Immobilisation
  Ice therapy for 10 to 15 mins.
  modalities: US, TENS, IFT, Hot pack.
- Improvement of general condition
  - Elbow crutches in severe painful cases
  - Stretching the calf muscles.
  - Strengthening of foot muscles.
  - Swimming or cycling for 30 minutes every day ↑ses the blood flow.
- Build up – strengthening the calf muscle.
  Begin jogging,
  Include jumping exercise.

HEAD & FACE

MAXILLOFACIAL INJURIES.

In sports, facial fracture may result from blow by impliments such as belts, sticks equipment. ~~such as~~

Mountain biking is a sports that cause significant propulsion of facial injuries.

The injuries can include - skin laceration, burns, obstruction to nasal cavity or sinus, damage to orbital sockets, missing teeth and fracture to jawbone.

Fractures may involve jaws, palate, cheekbone, eye sockets etc.

Causes - Explosions
Gunshot
RTA
sports injuries
blunt force trauma.
Direct blow to face.

C/F - Changes in feeling over face.
Missing teeth.
Pain
swelling

- Laceration or bruising.

→ Examination - • facial asymmetry
• Obvious deformity
• Discolouration
- Opening and closing the jaws may cause pain.

→ Management -

Initial hospital care - A, B, C, D, E.

A — Airway in cervical spine control
B - Breathing and ventilation.
C - Circulation and hemorrhage control.
D - Disability due to neurological deficit
E - Exposure and environment control.

Fracture of zygomatic - maxillary.

Zygomaticus maxillary complex fracture occurs from a direct blow to the cheek such as from a fist, hockey stick or baseball.

Sign include - swelling, bruising, flatness of the cheek, and mandibular function disturbance, asymmetry of the eye.

surgery - close or open reduction under GA.
Unstable fracture require fixation.

Maxillary fracture - Explain.

* HELMET COMPRESSION SYNDROME

A helmet compression syndrome a type of headache that starts when you wear something tight across your forehead or scalp.

Hats, goggles and ~~the~~ helmets are common cause.

Causes - • Wearing a tight object around head which puts pressure around head and nerves.

- football, hockey or baseball helmets.
- Police or military helmets.
- hard hats used for construction
- Swim or protective goggles.
- head bands.
- tight hats.

Symptoms - • Pain that's steady.
• Pain goes away within an hour of removing the source of pressure
• compression headache is observed.

Symptoms of migraine include :-

- Nausea , vomitting
- blurred vision
- Sensitivity to light , sound and touch.

Treatment - - Compression headaches are some of the easiest headaches to treat.

NSAIDs , pain relievers such as Ibuprofen, Acetaminophen , aspirin ,

* SHOULDER INSTABILITY.

Shoulder ~~disability~~ instability is defined as loss of shoulder comfort and function due to undesirable translation of humeral head on the glenoid fossa.

Both structural and non-structural components can contribute to the instability of the shoulder.

→ Classification of shoulder instability.

▸ Based on the direction of shoulder instability

- Anterior instability - translation of the humeral head in anterior direction. It is the most common form of shoulder instability.

- Posterior instability - the athletic population is affected by this type who participate in an overhead activity.

- Multidirectional instability (Atraumatic) - It is the combination of Anterior, posterior and inferior instability at the GH Joint.

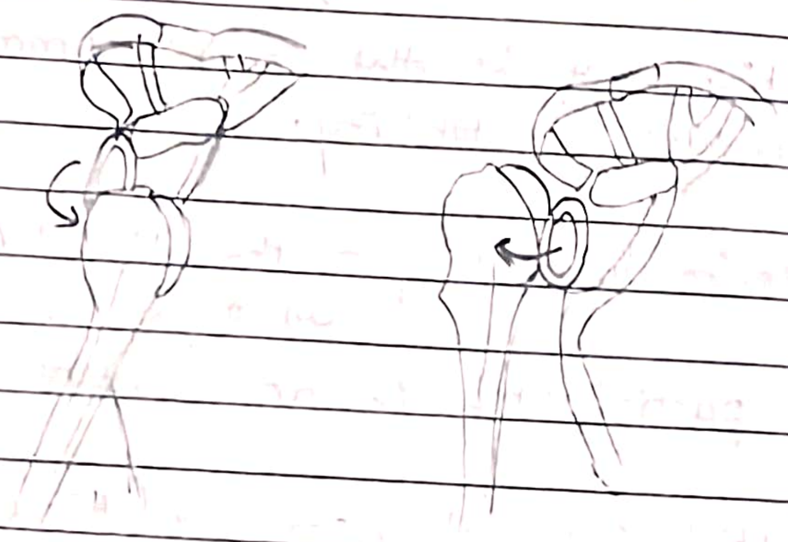
This can be caused due to repetitive trauma.

▶ Traumatic unidirectional instability with Bankart lesion.

- Anterior dislocation – The arm is forced into excessive abduction and external rotation.
It damages anterior part of the labrum (Bankart lesion).

The humeral head is palpated anteriorly.

- Posterior dislocation – The cause is a fall on the outstretched hand or a direct blow on the shoulder in IR of adduction.



Anterior D. Posterior D.

▶ Acquired sports specific instability

commonly seen in overhead athletes

when the anterior capsule has become lax due to overuse.
The C/f is recurrent shoulder pain while throwing.

- Atraumatic / Non-traumatic – Two main types of atraumatic instabilities:

  - Congenital instabilities – laxity of structures in shoulder anatomy present from birth.

  - Chronic recurrent instabilities –
    - Maybe seen after surgery for shoulder dislocation.
    - Microtrauma

→ ANATOMY.

Glenohumeral stability depends on the combination of various factors:-

- Capsulo-ligamentory or static stabilizers.
- Dynamic stabilizers.

1. Static stabilizers –
   - Superior GH ligament
   - Medial GH ligament.
   - Inferior GH ligament.
   - Glenoid labrum.

- Dynamic stabilizers — • Rotator cuff (m).
  - • Long head of Bice
  - • Deltoid
  - • Teres major
  - • Lattissimus dorsi
  - • Pectoralis major.

→ Mechanism of Injury.

Injury — sports injuries, RTA

Repetitive use — Repeated overhead motion
overhead games.

→ C.F :- • Anterior instability — clicking
Pain
complain of dead arm
Pain posteriorly.
↑sed motion in the anterior direction

• Posterior instability — Pain, clicking.
↑ motion in post. direction

Examination

• Subjective — History of trauma and pain
Activities of Daily Living is difficult.
Painful ROM around shoulder

- Physical Examination.

- Observation / Palpation - Long H of biceps, supraspinatus, AC joint, SC joint, spine, 1st rib and ⓦ.

- Posture - Asymmetry
Scapular winging,
Atrophy.

- Active ROM - GH joint - All motion.

- Passive ROM - Many have pain

- Muscle length testing.

- Special tests.

▶ Laxity tests.

1. Load & shift test - The patient lies on their back with the scapula on the table but the head free.

Load the caput humerus into the glenoid and then translate the ~~caput~~ head in the anterior and posterior direction.

2. Drawer test – The patient is positioned supine. The examiner holds the patient's scapula with his left hand while grasping the humeral anterior head with his right hand.
The test is positive when the thumb was felt to slide past the coracoid.

Other tests.

1) Anterior release test – – In this test, the examiner applies posteriorly directed force to the humeral head, with the patient being in abduction and external rotation.
The test is positive in case of pain.

2) Apprehension test – – The patient is lying or sitting with the shoulder in a neutral position (90° Abduction).

The examiner holds the patient's wrist with one hand and with the other hand he applies anteriorly directed force to the humeral head.

3) Relocation test - The patient is in the starting position of the apprehension test and the examiner now applied posteriorly directed force to the humeral head.

→ Management

1) Medical management - NSAIDS.

Activity modification is done who experience instability only with certain activities.

2) surgical - Arthroscopy.
Open surgery - for ligaments, labral repair.

3) Physiotherapy - • Postural re-education
• Education to prevent recurrence.
• Motor control training for specific muscles during activities.
• strengthening in particular the deltoid, rotator cuff (M) and scapular stabilizers.
• Stretching in posterior shoulder structure, Pectoralis major and minor.
• Manual therapy targeting mobility in shoulder joint.

Physiotherapy following surgery.

- Immobilized shoulder for 3 week.
- Isometrics
- Arm flexion in supine
- Rotator cuff exercise was started in [illegible] [illegible].
- Upper limb muscle training under 2kg
- Cryotherapy for pain & edema
- Modalities used are - US, TENS.

* ROTATOR CUFF INJURY.

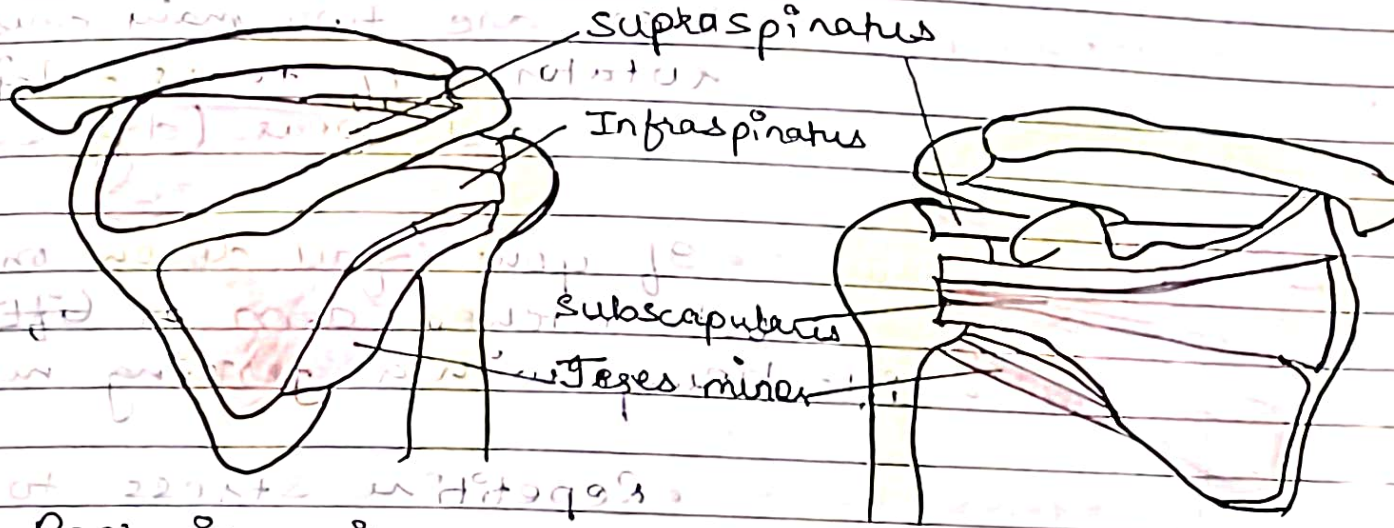
The rotator cuff consist of muscles and tendons that hold your shoulder and provide strength and stability during motion.

It is referred to as SITS muscle naming - (supraspinatus, infraspinatus, Teres minor, subscapularis)

→ Anatomy : The rotator cuff muscles include

Muscle	origin	insertion	function
supraspinatus	Supraspinous fossa	Superior facet of greater tuberosity	Abduction

Infraspinatus.	Infraspinous fossa.	middle facet of greater tuberosity.	External rotation.
Teres minor	lateral border of scapula	inf. facet of greater tuberosity.	External rotation.
subscapularis	subscapular fossa,	lesser tuberosity	Internal rotation



Posterior view

Anterior view

→ Common Injuries :-

The most common injuries to the rotator cuff are :-

1) Rotator cuff tear – micro or macro tearing of the muscles or tendo

2) Rotator cuff tendinitis - acute inflamm-ation of the Rotator cuff soft tissues.

3) Rotator cuff tendinopathy - chronic irritation or degeneration of the RC soft tissue

4) Impingement Syndrome - Biomechanical dysfunction of the shoulder complex.

→ Etiology - There are two main causes of rotator cuff tears: injury and wear (degeneration)

→ Acute tear - • If you fall down on your outstretched arm or lift
• lift heavy with a jerking motion

→ Degenerative - • Repetitive Stress to shoulder joint - muscles and tendons. Sports such as baseball, tennis and weight-lifting that can cause overuse inj

• Lack of blood supply - As we grow older the blood supply lessens. Without a good blood supply the tendon damage cannot be repaired and ultimately leads to tendon tear.

→ Smoking and inflammation of the joint capsule (frozen shoulder) can lead to rotator cuff tear.

→ C/F – • Severe pain at time of injury.
• Pain at night
• Pain with overhead activities.
• Positive painful arc sign
• weakness of involved muscles.
• shoulder stiffness
• Crepitus.

→ Examination – X Ray, MRI, Ultrasound.

Physical examination should include inspection and palpation, ROM, strength testing and special tests.

ROM test for all movements.

Strength can be tested by MMT.

▶ Test for subscapularis

• Lift off test – – Patient – – sitting.

Procedure – The affected arm is brought into maximal internal rotation behind the back (behind lumbar region).

Examiner controls patients arm at the elbow

and wrist which passively brought 90° extension taking the forearm away from back

Of the patient cannot maintain the movement it indicates subscapularis tendon tear

▶ Test for supraspinatus and Infraspinatus

- External rotation lag sign -

The position of patient is seated. The elbow is passively flexed to 90° and the shoulder abducted to 90° and held 5° external rotation.

The patient is asked to maintain the position actively but therapist supports the elbow.

The inability to maintain the position would indicate Rotator cuff tear.

- Drop arm test - The position of patient is seating.

The therapist stand behind the patient and passively abduct the patient's arm to 90°, and full external rotation while supporting the elbow.

Release the elbow support and ask the patient to slowly lower the arm back to neutral.

The test is positive if the patient is unable to maintain the movement and slowly neutrals.
If the arm is suddenly dropped then the test is positive.

- Hees test :- The patient is seated. The examiner should stabilise the patient's scapula with one hand, while passively flexing the arm while it is IR.

If the patient reports pain in this position the test is +ve.

- Test for Teres minor muscle.

- Hornblower's sign :- The patient is seated or standing.
The examiner places the patient's arm to 90° in the scapular plane and flexes the elbow 90°.

The patient is asked to externally rotate against resistance.

The test is true if the patient is unable to ER.

→ Medical Management –

There are three types of surgical treatments to repair rotator cuff tears.

- Open Surgery – A traditional open surgical incision is often required for large or complex tears.

- Arthroscopic Repair – An optical scope and small instruments are inserted through small puncture wounds instead of through a larger incisions.

- Mini-open repair – ~~New techniques~~ ~~and~~ It leaves few scars.

→ Physical therapy management –

Non surgical treatment may include NSAID's and steroid injections and local rest.

Goals –
- Reducing pain
- Reduce muscle tension in the neck area.
- Improving wrong humeral head position.

Strengthen the muscles to stabilize the joint.

- Regain proprioception.
- Improve neuromotor rehab.

Management.

- Cryotherapy – for ↓ pain, swelling.
- Thermotherapy – Helps to ↑ circulation and remove toxins.
- US therapy – used around inflamed area to ↓ pain.
- TENS – ↓ Pain and muscle tension in the scapular and shoulder areas
- Iontophoresis – for swelling relief specific drugs are applied.
- Kinesio – Taping – for Pain free ROM and joint stability.
- Passive and active ROM.
- Codman's exercise.
- Strengthening exercise
- Mobilization of the scapulothoracic joint
- Soft – tissue massage – for muscles and ligaments.
- Stretching
- Plyometric training

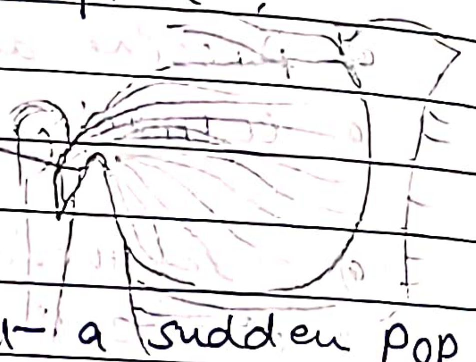
* PECTORALIS MAJOR RUPTURE

Pectoralis major tendon rupture is a rare shoulder injury, commonly seen in weight-lifters.

→ Causes - • Severe weightlifting.
• Bench press.
• Sports such as boxing, football, water skiing and wrestling.

→ CF - • Mild swelling.
• Bruising can be seen over the proximal arm.
• Pain generally not intense.
• Less pectoralis muscle contour.
• Asymmetry in both chest area.
• loss of strength while doing IR.

→ Classification : Grade I - Contusion
Grade II - Partial lesion
Grade III - Rupture.



→ Physical Examination.

• History - May report a sudden pop or tearing sensation, with resisted adduction and IR.
Asymmetry of chest.
• Symptoms - Pain and weakness of shoulder.

- Inspection & Palpation.
  - Swelling in antero-lateral chest wall.
  - Dropped nipple.
  - loss of anterior axillary contour.
  - weakness in adduction and IR.

ROM assessment

~~Imaging~~ — MMT.

→ Imaging — X Ray, MRI.

→ management —

Conservative — Icing, massage and acupressure for pain relief.

Surgical — Open primary repair.
Reconstruction surgery..

→ PT management

Post operative management.

0-2 weeks — • No exercise.
• Sling immobilization for 2 we
• Passive rest for 2 weeks.

Week

~~3 to 6~~ weeks 2 – • Sling immobilization upto 3 weeks.
• Begin Passive ROM.
• ER started

week 3 – • Sling is removed.
• Passive ROM.
• Begin all movements.
• Gentle isometrics started.

week 5 end – • Isometrics of shoulder, elbow, hand & wrist.
• Scapular isotonic exercise
• Passive ROM.

Strengthening phase – • Isometrics.
• PRE.
• Theraband exercise.
• Dumbell exercise.

* SCAPULAR DYSKINESIS.

SD is a physical impairment in which the scapula's position and motion are altered.

~~The word dyskinesia dag~~

→ Scapular Biomechanics.

The movement of the scapula can be divided into 3 motions and 2 translations.

- Three motions – 1) Upward / downward R.
  2) Internal / External Rotation
  3) Anterior / post. tilt.

- 2 translation – 1) upward / downward. sliding on the thorax
  2) Medial / lateral sliding around thorax.

→ Etiology – The causes of SD are many but they can be looked at in three groups :-

a) Shoulder related
b) Neck related
c) Posture related.

a) Shoulder related – • AC instability.
• Shoulder impingement.
• Rotator cuff injuries.
• Glenoid labrum injuries.
• Clavicle fracture.
• Inflexibility of PMM.

b) Neck related – • Neck pain syndromes.
• Cervical nerve root problem

c) Posture-related – • Excessive thoracic kyphosis.
• Cervical lordosis.

→ Cf – • Can be symptomatic and asymptomatic.
• Anterior shoulder pain.
• Posterosuperior scapular pain.
• Superior shoulder pain
• Proximal lateral arm pain –

→ Clinical Examination.

The clinical examination can be determined by :-

• Determining the presence or absence of Dyskinesis.

Based on the visual presentation, one of the 4 types can be determined :

Type I – Inferior angle prominence.
Type II – Medial Border –"–
Type III – Excessive sup. border elevation
Type IV – Absence of SD, symmetric scapular motion.

\# Tests - a) The scapular Assistance test
b) The scapular reposition test

a) SAT - The patient is asked to do arm flexion and rate the pain.
The same process is repeated while the examiner pushes upward and laterally on the inferior angle.

If two or more points of pain is seen then the test is +ve.

b) SRT - The patient is asked to do 90° of flexion with shoulder IR while the examiner stabilizes the medial border with one hand.

Then the patient is asked to hold the position while the examiner is applying resistance with the other hand.

If the pain felt by the patient is ↓ with the assistance the test is +ve.

\# Muscle test - • Serratus A. in flexion
~~For Upper~~.
• For lower & middle trapezius in abduction
• For Rhomboid in extension.

→ PT management-

The treatment of SD aims at the restoration of scapular retraction, posterior tilt and ER. Specific exercises for scapular rehabilitation.

- flexibility exercises - To ↑ flexibility of the pectoralis minor and ER, and posterior tilt of the scapula, shoulder horizontal abduction at 90° and 150° of elevation.

- Stabilization exercises - CKC, OKC, pushups, resisted scapular retraction.

The SA and trapezius plays an imp. role in scapular stabilization.

Shrug exercises activate the upper and lower trapezius.

* ACROMIOCLAVICULAR JOINT INJURY.

→ Anatomy.

The AC joint is a joint of two bones acromian process of clavicle and clavicle lateral end.

The AC joint is surrounded by a capsule and reinforced by the superior / inferior capsular ligaments.

→ Etiology – • shoulder girdle injuries in athletes.
- falling on out-stretched hand.
- Direct blow to the shoulder.
- falling onto the point of the shoulder
- The injury is frequently seen in hockey and rugby players.

Cf – Pain is felt radiating to the neck and deltoid
The AC joint may also become swollen

Date / /
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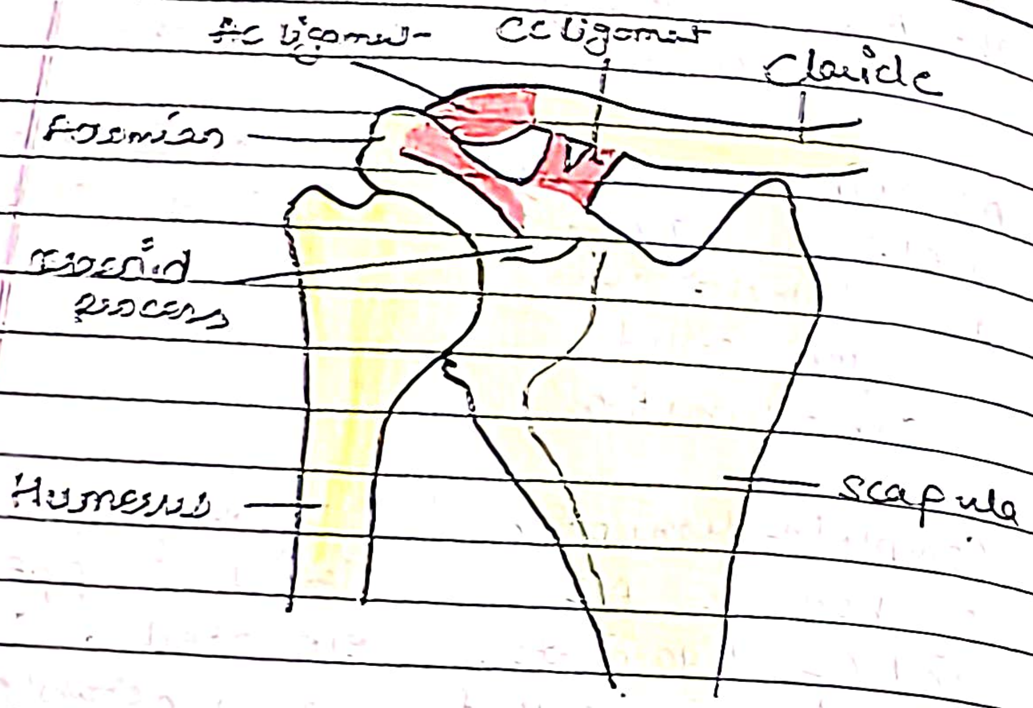
Grading of A.C. joint Injuries.

Grade	Description	Observation / Testing
G. I	Sprain of A.C ligaments. The A.C. and CC lig. are intact.	No instability of clavicle detected on stress tests.
II	AC ligaments are ruptured. CC ligaments are intact. This is often called sub-luxation.	Clavicle is unstable to direct stress test.
III	Complete disruption of both the AC and CC ligaments. This is often called dislocation.	Deformity present with clavicle appearing elevated. Clavicle is unstable
IV	Distal clavicle is posteriorly displaced into trapezius (m).	Posterior deformity present.
V	More severe form of grade III. Complete disruption of AC & CC ligaments with disruption of the deltoid and trapezial fascia.	downward displacement of scapula.

VI	Inferior displacement of the distal clavicle. either subacromial or subcoracoid.	Severe trauma



→ Investigation - X Ray, MRI.

→ Examination - • AC joint palpation for tenderness.

• Resisted AC joint extension test - -

The patient is seated with the therapist standing behind him/her.

The patient's shoulder is positioned.

into 90 flexion and IR.

The therapist places him/her hand on the patient's elbow and asks him/her to horizontally abduct the arm against isometric resistance

→ Medical Management.

For type III, II, I is treated by conservative treatment.

For Type IV and V surgical repair is recommended.

- AC joint fixation using hook plates.
- CA ligament transfer
- CC internal fixation.
- CC ligament reconstruction.

→ PT management :-

Conservative – Type I and Type II

Initial treatment should be POLICE protocol including protection, optimal loading, ice, compression, elevation and done in first 48 hours.

Sling used for immobilising the joint.

Taping to help support the joint can be useful.

After six weeks or 6 weeks patient whose pain does not improve, intraarticular injections may be given.

Acute phase - ROM exercises for different purpose:

- GH joint - towel slides, pendular exercise.
- Scapula - Protraction, retraction, elevation and depression.
- Active assisted exercise.
- Soft tissue - manage tightness.
  - Pectoralis minor stretch.
- OKC, CKC exercise.
- Wall slide, push-ups on wall.

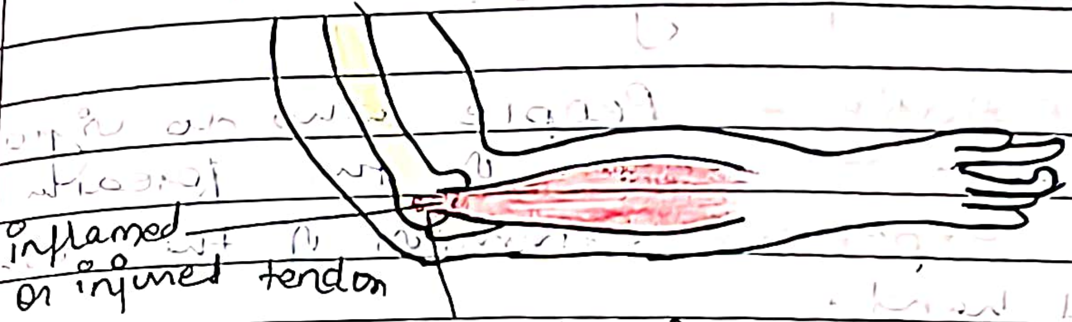
Recovery Phase - ROM exercise with resistance.
CKC with loads.
Plyometric exercises.

ELBOW

* TENNIS ELBOW.

Tennis elbow is a common entity characterised by pain and tenderness at the common origin of the extensor group of muscles of the forearm.

It is called tennis elbow because it was thought to be caused by an awkward stroke during the game of tennis.



→ Clinically relevant anatomy.

The elbow joint is made up of 3 bones Humerus, Radius and ulna. At the distal end of the humerus there are two epicondyles, one lateral and one medial.

The area of maximal tenderness is usually an area ~~just~~ origin of the extensor muscles of the forearm at the lateral epicondyle.

Most frequently, the extensor carpi radialis brevis ~~ECRB~~ (ECRB), is involved but others may include the extensor digitorum, extensor carpi radialis longus, and extensor carpi ulnaris.

→ Etiology

a) Overuse - The ECRB muscle helps to stabilize the wrist when the elbow is straight. An overuse can cause lateral epicondylitis.

b) Activities - People who do vigorous use of the forearm muscle or repetitive extension of the wrist and hand.
Painters, Plumbers and carpenters are prone to tennis elbow.

c) Age - Most people who get tennis elbow are b/w the ages of 30 and 50.

d) Hypovascularity - Hypovascularity of the muscle can cause tendinitis.

→ CF – • Pain produced by palpation on the extensor muscles origin on the lateral epicondyle.

• The pain can radiate upward and downward.

• flexibility and strength of wrist extensor muscles are deficient.

• weakness in grip strength. This is due to finger extensor and supinator weakness.

• The symptoms worse during shaking hand, or holding something.

→ Assessment –

Subjective assessment –

Onset of pain 24 to 72 hours after active movement involving wrist extension

Pain may radiate down forearm.

Difficulty in lifting and gripping.

Objective Assessment -

Pain and point tenderness over lateral epicondyle.

Pain and weakness on resisted wrist flexion.

weakness on grip strength testing.

weak elbow extensors and flexors.

→ Diagnosis - ultrasound examination.
X Ray
EMG
MRI

→ Medical management

a) Non - operative — Rest.
NSAID's for pain.
Elbow counterforce brace. for ↓ pain.
Injections for ECRB for effective results

b) Surgical — Open surgery.
Arthroscopic surgery.

→ PT management.

- Modalities - Ice, Massage, TENS, US, Laser, shockwave therapy.

- strengthening and stretching.
- Manual therapy - mulligan that is mobilization with movement.
- Eccentric exercise - with ↑sing load.
- Theraband exercise
- Taping.

b) ~~Risk factors~~.

* GOLFER'S ELBOW.

Also known as Medial epicondylopathy is a overload injury.

Flexor pronator tendon degeneration occurs with the repetitive forced wrist extension and forearm supination.

The muscles which originates from medial condyles are: Pronator teres, flexor carpi radialis, Palmaris longus, flexor digitorum superficialis & flexor carpi ulnaris.

The most frequent pathology occurs in the origin of ~~FR~~ FCR and pronator teres.

Etiology - a) Racket-sports - Improper techniques with tennis strokes, can cause injury to the tendon.

b) throwing sports - Improper pitching technique in baseball can be cause. football, archery and javelin throwing also cause golfer's elbow.

c) weight-training - Lifting weights using improper technique such as curling the wrist - can cause overload to the elbow muscles.

d) forceful, repetitive occupational movements - These occur in field's such as construction, plumbing and carpentry.

→ C/F - • Pain of the elbow distal to the medial epicondyle with radiation up and down the arm.

- Local tenderness with swelling.
- stiffness of the elbow.
- weakness in hand and wrist.
- Numb or tingling sensation in fingers mostly in ring and little finger.
- Hand grip weakness

Examination.

- Tenderness on palpation over pronator teres and flexor carpi radialis.
- Local swelling and warmth.
- Medial epicondylopathy test - the patient complains of pain in shaking hands. For active test, patient should resist wrist flexion.
- ROM test.

Medical management.

Mini-open resection surgery under LA. Fascial elevation and tendon origin resection.
Steroid injections for early symptoms.

PT management.

Phase I - PRICE Protocol is applied
Night splinting is given.
US, galvanic current is applied

Phase II - Painless wrist and elbow range of motion exercise followed by stretching and Isometric

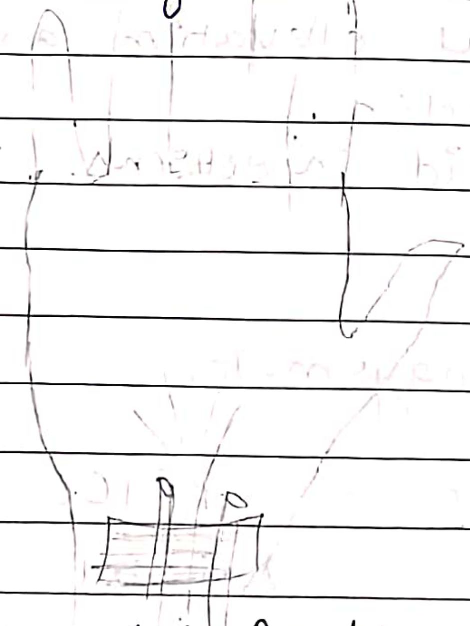
strength training is given.
Manipulation technique allows more vigrous stretching.

phase 3 – This phase is all about strengthening and increasing endurance.

Wrist & han

* CARPAL TUNNEL SYNDROME

CTS is an entrapment neuropathy caused by compression of the median nerve as it travels through the carpal tunnel of wrist.



Clinically relevant Anatomy.

The CT is formed by the transverse carpal ligament superiorly and the carpal bones inferiorly, protecting median nerve and flexor tend

The carpal tunnel includes the median nerve and nine flexor tendons.

→ Etiology - Studies shown that women and older people are more likely to develop the condition.

- Repetitive hand use - Repeating the same hand and wrist motions over prolonged period of time may cause swelling, which puts pressure on nerve.

- Hand and wrist position - doing activities that involve extreme flexion and extension of wrist can cause pressure.

- Pregnancy - Hormonal changes during pregnancy can cause swelling that results in pressure on the nerve.

- Health conditions → Diabetes, RA, and thyroid gland imbalance ~~are~~ can cause CTS.

→ Pathophysiology.

There is a wide spectrum of causative pathologies, converging on two mechanisms of disease, both of which lead of entrapment:

- ↓ in the size of the carpal tunnel caused by such conditions are : OA, trauma, acromegaly.
- Disease states leading to augmentation of carpal tunnel contents : masses such a ganglion, hypertrophy,
- Idiopathic CTS - occurs mostly occurs more in females.

→ CF - • Tingling or numbness in median nerve distribution of the affected area.
- Patient may notice symptoms with static gripping of objects.
- Burning sensation in the thumb and index, middle and ring fingers.
- Shock like sensation
- Dropping things - due to weakness.

→ Physical Examination

Carpal compression test - This is done by applying firm pressure directly over the carpal tunnel for 30 seconds. The test is positive when pain and paresthesia are produced.

Phalen's test - It is performed by having the patient fully flex their wrists by placing dorsal surfaces of both hands for one minute. The test is positive when symptoms are seen.

The Reverse phalen's or Prayer test - Put both hands in prayers sign by joining both hands.

Medical management -

Non surgical - treatment - comprises oral steroids, corticosteroid injections, NSAID's, diuretics and vitamin B6.

Splinting and hand brace is applied.

Surgical - Open or endoscopically method used for carpal tunnel release.

PT management :-

Manual therapy techniques include mobilisation of -
- soft tissue
- carpal bone
- median nerve.

Other modalities include Ultrasound and EM field therapy and splinting.

TENS have little useful effects.

Cold therapy and shock wave therapy relieves pain.

Massage and Tapping techniques best for long term pain.

Stretching – wrist bend upward position done by keeping the elbow straight and palm facing ~~down~~ up. Use the opposite hand to press the stretch hand back towards the body (hold 15-30 sec.).

wrist bend downward position. Same as above but palm facing downward.

Strengthening – Support the elbow & place affected palm on the table. Place the other hand across the affected knuckles and push down.
Push affected hand upward.

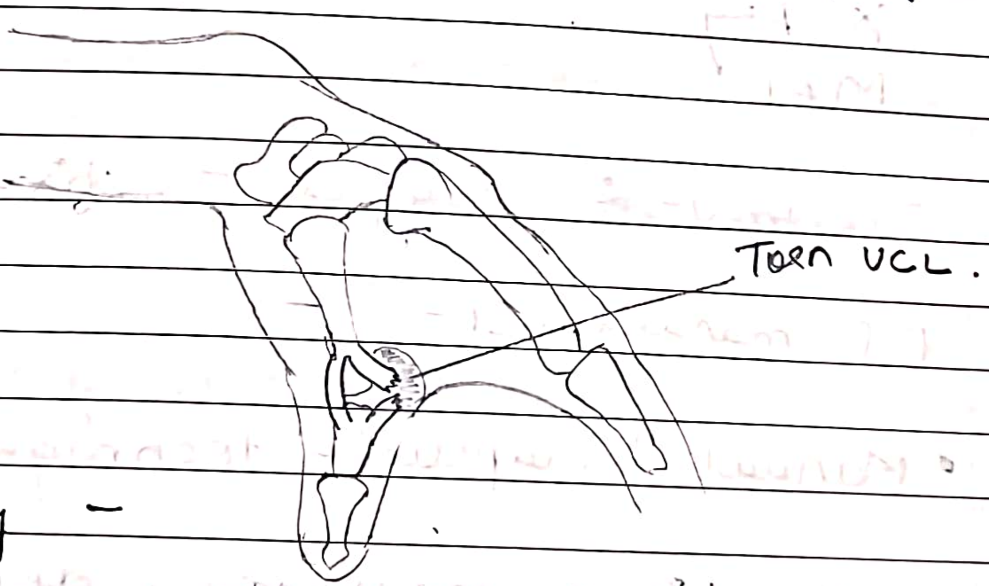
* GAMEKEEPER'S THUMB

gamekeeper's thumb, also known as skier's thumb, is an injury that affects the ulnar collateral ligament (UCL) of the thumb.

The UCL band helps to stabilize the thumb joint.

The injury occurs when the thumb is bent backward or sideways, causing the UCL to stretch or tear.

The term gamekeepers thumb first originated from scottish gamekeepers who frequently experienced this injury.



→ Etiology -

fall on an outstretched hand that pulls the thumb away from the index finger.
Skiing accident.
Repetitive use of UCL.

RA or nicotine use can also weaken the ligament.

CF – • Instability of the MCP joint along with pain and weakness.

• Pain, swelling and bruise around thenar eminence.

• Weakened ability to grasp objects or perform such tasks as tying shoes.

Diagnosis – The doctor may manipulate the thumb (valgus stress test) in comparison to opposite thumb.

X Ray.
MRI

Treatment :- Surgical – fixation is done

PT management –

• Manual therapeutic technique – Hands on care including soft tissue massage, deep friction massage and joint mobilization by a hand to regain ROM of thumb and hand.

- Splinting to support or rest affected area.
- Therapeutic exercises including stretching and strengthening exercises to regain ROM and strengthen the hand and effected muscle.
- Neuromuscular Re-education – to restore stability, retrain the upper extremity, and improve movement technique and mechanics.
- Modalities that can include the use of US, Electrical stimulation, Ice, laser to decrease pain and inflammation.

* JERSEY FINGER.

Jersey finger also known as Rugby finger is an avulsion of the flexor digitorum profundus tendon from its distal insertion on the distal phalanx.

The ring finger is most commonly affected.

Cause / Mechanism of injury.

Injuries occur in ring finger at the point of insertion which is the weakest point in the tendon.

Cf - • The injured finger is unable to bend at the fingertip, ~~even through the finger~~ ~~[illegible]~~

• The fingertip maybe swollen and painful.

• People often hear popping sensation at the time of injury.

• The ring finger is most often involved but any finger can be affected.

Treatment - If the tendon is partially torn then surgery is not required.

• The patient is recommened to use splints to help stabilize the fingers.

NSAID's is given for pain.

PT management - Splinting
Passive ROM.
Active or assisted ROM exercises
Place and hold relax exercises.
Strengthening / power grasping exercises
Scar massage.
Tendon gliding exercise.

FEMALE ATHLETIC TRIAD

The female athlete triad comprises three medical condition, and is seen commonly in active teen girls:

- Energy imbalance with or without an eating disorder.
- Menstrual disturbances.
- Decreased bone mineral ~~dis~~ density

→ Sign and symptoms of female athletic-triad

- No periods or irregular pediods
- weight loss of low BMI.
- Stress fractures (tiny cracks in bones)
- Other broken bones or sports injuries.

→ What happens in female athlete triad?

Exercising alot and not eating enough calories can cause problems like a decrease in the hormones that help control a girl's monthly cycle.

Low estrogen levels, poor nutrition and not enough calcium or vit. D in the diet cause bone loss.

→ Mechanisms

The three components comprise:

- Low energy Availability with or without an eating disorder.

A low energy availability can be due to ↓ dietary intake ~~and~~ or ↑ energy expended during exercise.

Some athletes may participate in restrictive diets or use ~~x~~ pills.

Other athletes may have a diagnosis of an eating disorder (eg. Anorexia nervosa, Bulimia Nervosa) including dehydration, muscle weakness, kidney damage.

- Menstrual dysfunction include - Amenorrhea and oligomenorrhea.

- Low Bone Mineral density - female athlete functioning at a low estrogen state, have less osteoblastic activity.

Stress fracture is most commonly seen.

→ Manifestations including systemic involvement.

- weight loss
- Absent or irregular menstrual cycles.
- chronic fatigue
- fracture without any trauma
- compulsive exercise
- Nutrient deficit.
- constipation
- changes in thyroid function, & in insulin.
- ↑sed CV risk.
- Impaired performance
- vaginal dryness.

→ Diagnosis

- BMI, Period problem, stress fracture, overuse injuries is tested.

- Blood test - to check anaemia.

- ECG to look irregular heart-beats.

- Bone density testing.

→ Treatment -

- Pharmacological - gonadal steroids, bone restorative medications

and [illegible] = approach.

PT management -

Resistance exercises
Agility training
Running.
Strength Training.
Endurance training.